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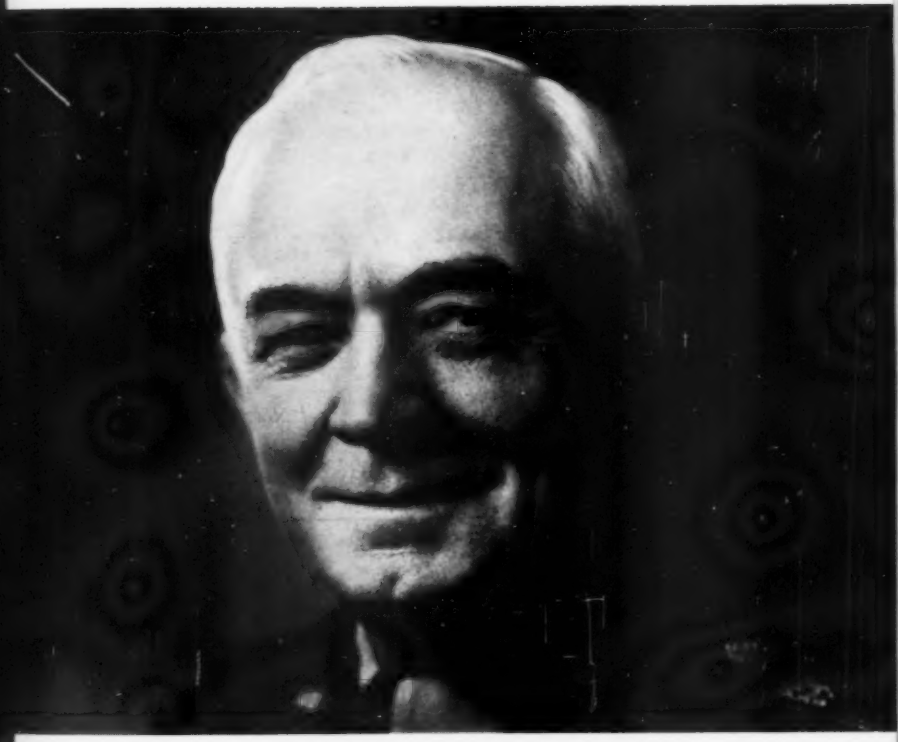
July 1959
Volume VI Number 3

The Airpower HISTORIAN



General of the Air Force Henry H. Arnold

THE AIR FORCE HISTORICAL FOUNDATION

NOTICE TO MEMBERS

You are cordially invited to attend the Sixth Annual Meeting of The Air Force Historical Foundation which will be held this year in Washington, D. C., at the Bolling Air Force Base Officers' Club, on Friday, the 23rd of October.

The Executive Council, in changing the time and place, took into consideration the advantage of the pleasant and mild autumn weather of our nation's Capitol and the concentration of the greatest number of our members in the area.

As is customary, ALL members of THE FOUNDATION are invited to attend the sessions in the morning and in the afternoon. The morning activities, to begin at 1000 hours, will be a combined business meeting of the Executive Council and the Board of Trustees. The afternoon session, following the luncheon, will consist of the completion of the morning business, informal business, and the resolution of general problems. All members in attendance at this session are cordially invited to participate in the discussion of the problems.

Included in the discussion of business will be the naming of the newly elected members of the Board of Trustees.

A cocktail party will follow the business agenda in the afternoon.

The Airpower HISTORIAN

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VOLUME VI • NUMBER 3 • JULY 1959

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All pictures in this issue are from official Air Force photographs. The editors of *The Airpower Historian* wish to express their gratitude to Miss Virginia Fincik, Photographic Records Division, Headquarters, USAF, for her assistance in selecting the pictures used to complement the articles in this issue.

It is the policy of *The Airpower Historian* neither to endorse nor subscribe to the views expressed in the articles it presents. Many events in history must perforce remain controversial by reason of the multiplicity of interpretations given these events by those who participated in them, or have studied them from hindsight. Appropriate articles are invited for consideration.

Published by **The Air Force Historical Foundation,** Maxwell Air Force Base, Montgomery, Alabama

Annual Subscription $3.00 Issued Quarterly
Second-Class Postage Paid at Montgomery, Alabama

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THE AIR FORCE HISTORICAL FOUNDATION

Everybody Knows How It Ended

By the late GENERAL OF THE AIR FORCE H. H. ARNOLD
from his book, "Global Mission"

Excerpts relating to Billy Mitchell in General Arnold's book, "Global Mission," published by Harper & Brothers 1949, were assembled into a single paper for publication in THE NATIONAL AIR REVIEW by William R. Laidlaw and Lieutenant Colonel Charles D. Frazer. Laidlaw was a collaborator with General Arnold in preparing material for the book; Colonel Frazer was Executive Secretary of The National Air Council and Editor of THE NATIONAL AIR REVIEW. It is on their recommendation and approval that we bring this outstanding historical document to the readers of THE **Airpower** *HISTORIAN.*

"FIGHTING GENERAL" BILLY MITCHELL

Outspoken, audacious, and born too soon, he became the leader of the fight for airpower as a category of conflict rather than an ancillary force.

The late Brigadier General William E. Mitchell was one of the stormiest, most colorful, and controversial figures in aviation history. Here Billy Mitchell and his spectacular career are described by his colleague and friend, by the man who probably knew him best, the late General of the Air Force, H. H. (Hap) Arnold.

It is 1912. Henry H. Arnold, then a lieutenant, is conducting training at the Army Flying School at College Park, Maryland. In this article abstracted from his book, the author tells of his first meeting with Billy Mitchell and of the latter's rise to military fame.

One day (1912) a sharp-faced, eager young captain of the General Staff came in to see me. He was not a flyer himself, but was working on a paper concerning the military future of aviation which he intended to present to the Army War College. He had recently returned from Alaska, where he had apparently put in a highly interesting and most observant tour of duty. Afterward he had been in Japan where he had had a look at the Japanese Army. He said the Japanese Air Force was bigger than ours—it had ten planes. His questions about the air were intelligent and to the point; in fact, it was he who did most of the talking, asking questions only to get concrete facts and accurate data. It seemed that as far back as April, 1906, he had written in the Cavalry Journal that "Conflicts, no doubt, will be carried out in the future in the air, on the surface of the earth and water, and under the earth and water." When he left, I had completed my first conference with Billy Mitchell. At thirty-two he was the youngest officer ever to have been appointed to the General Staff.

* * * * *

I was questioned (by a Congressional committee, 1913) about the "air power" of foreign nations, on which I was the War Department's "expert." A bit of the future was foreshadowed by the appearance of Captain Billy Mitchell, not as an airman—he was still neither a flyer nor in the Aviation Section—but as a representative of the Signal Corps on the War Department General Staff. As at his own court-martial later, Billy's thoroughness was exhibited, but the brilliance he showed, in conversation and in print away from such hearings, was not. A researcher will see that page after page of the transcript of Billy's testimony continues without any interrupting dialogue—there is only Billy's speech. He went back to early Europe, Bull Run, Gettysburg, and Admiral Cervera for examples, while the Committee members fidgeted restlessly.

* * * * *

By then (1915) the war in Europe was a year old. From across the world, we all looked toward it tensely, and I remembered many of the things that had been talked about during my first tour in the Philippines. In those days, by the way, George Marshall's strategic and tactical observations were as interesting as his interpretations during our maneuvers had been, and as accurate. We wondered what was going on at home. We understood that my old friend Billy Mitchell was a major in the Aviation Section himself—now, in fact, its Executive. During the winter of 1915-16 we also heard that he was learning to fly, at his own expense, at the Curtiss school in Newport News, Virginia. He was then thirty-six years old.

We were at sea aboard a San Francisco-bound transport in the late

winter of 1915-16 when I received a radiogram from the Adjutant General as abrupt as my original invitation to flight training had been. Would I volunteer for duty in the Aviation Section? Or if so detailed, would I object? Naturally, I sent back a reply asking what that meant. Immediately I received another message: "If you apply for detail in the Aviation Section, Signal Corps, you will come in with the rank of Captain. If not, you will be detailed and come in with the rank of First Lieutenant." I knew at once that my old friend Billy Mitchell was on the job in Washington.

After two winter months with an infantry outfit at Madison Barracks, New York, I was assigned, in May, 1916, as Supply Officer of the newly formed Aviation School at Rockwell Field (North Island), San Diego. Big changes had taken place in what was now known as the Aviation Division of the Signal Corps.

There were 23 Military Aviators (including Junior Military Aviators, a new rating since my time) and 25 aviation students, plus one nonflying officer. The planes were now all modern tractor types, the Burgess-Wright "C" itself a thing of the past, and the Curtiss JN (the famous "Jenny") the most active service model.

Though the mountains of Mexico had furnished hazards, and the dry climate had caused wooden propellers to fly apart, "military" aeronautics was playing a recognized part in the pursuit of Villa, carrying mail and messages, and flying reconnaissance and photographic missions. Compasses were still not too good, maps only fair, but the desire to fly cross-country was acute.

* * * * *

Major Billy Mitchell had already (April, 1917) sailed for Europe. A week before war was declared, he had landed in Spain, on his way to Paris as one of the first four American air observers. He had, perhaps inadvertently, speeded his own departure from Washington by some outspoken criticism of the way aviation preparations were being handled. The suggestion that we develop air units for the militia component when we still had practically none in the regular service, particularly irritated him. His public remark, "To Hell with the National Guard!" did not go down well, and caused Secretary of War Baker to make a corrective statement.

Within a few weeks, however, Billy Mitchell had already grown into one of the most popular American heroes of the war. He had become the first U. S. Army officer to fly over the enemy lines, had received his first *Croix de Guerre*, and despite the protests of the French General Staff, had spent ten days in the frontline trenches. He had seen Pétain, who put aside his pressing work to talk to him about American aid, and was sending home a steady flow of reports on every subject from bombs to the effectiveness of German parachutes. Our airmen, too, could have had parachutes by then, but they were turned

down as useless until after the Armistice—not by the War Department, but by flying officers themselves.

As for the Allied bombers, dropping a few one hundred-pounders on trenches and villages now and then, Billy reported in his enthusiastic style: "The bombardment people are sure that if they are given enough planes and explosives, there would be nothing left of Germany in a short while." He was impressed by the fact that "we could cross the line of these contending armies in a few minutes in our airplanes, whereas the armies have been locked in the struggle, immovable, powerless to advance for three years."

On May 24, 1917, exactly forty-eight days after President Wilson's War Message to Congress, the War Department had a virtual bomb dropped in its own lap. The famous cablegram of Premier Ribot arrived from France, outlining coolly what our immediate program should be. It recommended that America plan to send to the French Front, by the spring of 1918, 4500 airplanes, 5000 pilots and 50,000 mechanics, with the necessary accompaniment of personnel and materiel. It stated that 2000 planes and 4000 engines would have to be constructed each month and that, during the first six months of 1918, 16,500 planes and 30,000 engines (training planes and engines not included) would have to be built.

Forwarded from the White House to the Joint Army and Navy Technical Board, the French proposal received the approval of that body on May 27th. It was approved by the Secretaries of War and Navy the same day. We were told to prepare a Bill for Congress. Our understaffed Airplane Division in the War Department received the news with great interest. It was our first program. The total strength of the American air arm at that moment was 52 officers and 1100 men, plus about 200 civilian mechanics. Out of a total of 130 so-called pilots, only 26 were really qualified. Altogether, we had 55 airplanes, 51 of them obsolete, 4 obsolescent, and not one of them a combat type.

This, too—the cable from Premier Ribot to President Wilson—was Billy Mitchell's handiwork. A few of us recognized it at once. Later, Billy himself, jubilantly confirmed our guess. "I decided," says an entry in Mitchell's diary, early in May, "it will be a good thing to get the French Government to exert pressure on ours." His biographer, Isaac Don Levine, describes the way in which Billy called at the French General Headquarters and cooked up a communication which, on May 6th, went up from the commander of the French armies to the Minister of War, outlining the size of the air force which the United States should be requested to furnish "for obtaining and keeping control of the air." This memorandum called for 8000 planes on the line by May 1, 1918, out of a total of 20,000 machines, to be serviced by 38,500 mechanics, in addition to a heavy monthly output of engines. Shortly thereafter the Ribot cablegram was dispatched to President Wilson.

GEN. MITCHELL AND GUNNER IN WORLD WAR I SPAD
Mitchell, the crusader, believed that the optimum support for ground fighting was complete air superiority in the theater.

In "the Great War" . . . we had no theories of aerial combat, or of any air operations except armed reconnaissance. Despite Billy Mitchell's eagerness to blow up Germany, we hadn't a single bomber. Such things as formation flying, a new German development appearing on the Western Front that spring, were unknown to us. It was quite a shock to look helplessly at Europe that year and remember that ours was the country of the Wright Brothers and Curtiss, also the country of Riley Scott's bombsight and of the Lewis machine gun. It seemed more than three years since Germans and Frenchmen had fired pistols at each other as their planes passed in the air. The handfuls of fluted darts which both sides had dropped on marching troops in 1914, hoping to pierce the infantrymen's steel helmets, had given way, first to bombs made from finned artillery shells, and then to more scientific missiles. The aerial riflemen who had succeeded the pistol-duelling pilots had become aces firing machine guns, which, ever since Anthony Fokker completed his designs in 1916, had been synchronized to shoot through the propeller. These new weapons had evolved new air tactics, but until the Ribot cablegram came in May, our Army superiors were not especially interested in the airplane as a shooting weapon.

* * * * *

The initial Washington program of July, 1917, calling for an ultimate of 345 U.S. squadrons on the Western Front, and soon upped by the A.E.F.'s request to a projected 386 squadrons, was reduced on January 4, 1918, to a goal of 100 squadrons by December 31, 1918. In November, 1918, when

optimism had climbed high again and the end of the war was only three days distant, the A.E.F. had still asked us for only 210 American squadrons by July 19, 1919. It made little difference, for we continued training pilots, gunners, mechanics, and other men as fast as our equipment permitted. Then we formed new squadrons as rapidly as squadron equipment became available. That was really the only program we had.

We heard that Mitchell wasn't getting on with Pershing, and then again that Pershing thought Mitchell was wonderful. There was a rumor that there were frictions between Billy's "Get It Done" ideas and the more conservative methods of Foulois, his A.E.F. Air Service superior. One courier reported the British and the French were enthusiastic about the primary pilots we were sending them; another that the British and the French were shocked by the fact that most of the primary pilots we were sending had never fired a machine gun in the air. Everybody—British, French, Italians, and couriers from the A.E.F.—asked anxiously when more American squadrons and more American-built DH-4's were coming.

The various reorganizational plans which were always in progress in the Air Division do not require much comment, for so long as we were left under the command of Signal Corps officers who were not themselves airmen, the results could not have been basically different.

* * * * *

In France, where the air arm of the A.E.F. had already been called "the Air Service" for some time, there was an even more critical command snarl that spring (1918). Colonel Billy Mitchell, with his dynamic personality, his colorful dash and determination to get things done, had just about assumed command of all American aviation in Europe by the time General Foulois, the appointee of the Secretary of War, arrived to take charge.

Mitchell had created splendid relationships with the French and the British, had made arrangements on his own to secure equipment that was not forthcoming from the United States, and without portfolio had established himself as the leader of the American Air Force in the war. Arriving nearly a year after Mitchell, Foulois, with a much more studious careful, mechanical-minded experience of his own, dating back to the Army's first airplane, still had to make such contacts.

Pershing himself was dissatisfied with the slowness of getting American airplanes into combat. He was pleased only with the balloon setup. A clash between the red-tape-cutting Mitchell and General Foulois was bound to come, and come it did. Which man would the Commander of the A.E.F. select as his Air Chief?

Pershing selected neither. In a decision that affected the development of the American Air Corps for the next decade, he sent instead for an old West Point classmate, Brigadier General Mason M. Patrick of the Corps of Engineers.

"In this Army," he told Patrick

"there is but one thing that is causing me anxiety, and that is the Air Service. In it are a lot of good men, but they are running around in circles. Someone has got to make them go straight. I want you to do it."

Foulois was placed in command of the Air Force Services of Supply and Schools, in the rear area, with headquarters at Tours. General Billy Mitchell was placed in charge of all American Air Service Units under General Pershing. Colonel Thomas DeWitt Milling was in command of the Air Service Units of the First Army, which was commanded by Lieutenant General Hunter Liggett, and Colonel Frank P. Lahm was in charge of all Air Service Units in the Second Army which was commanded by Lieutenant General Robert Lee Bullard.

* * * * *

Between mid-July (1918) on the Marne, and September in the Meuse-Argonne, there were two American air triumphs, if not four, which may have altered the course of the war. First, on the morning of July 15th, a critical reconnaissance mission was flown by Billy Mitchell himself, which discovered the German army starting to move south across the Marne on five pontoon bridges east of Dormans (all the bridges were supposed to be down). Mitchell gave Pershing's headquarters exact knowledge of the whole German push. Our airplanes also helped in breaking up the enemy offensive.

Three days later, on the 18th, another brilliant and perilous reconnaissance mission, carried out by Major Lewis Brereton, with Major Elmer Haslett as an observer, showed the Germans to be in full retreat at a moment when Pershing's staff were still unaware of it and reluctant to counterattack. On the basis solely of his air intelligence, the A.E.F.'s commander grabbed opportunity by the horns (or tail). The last, long, very tough pursuit began.

The air offensive which Mitchell laid on in the Meuse-Argonne in September was the greatest thing of its kind seen in the war, although the Germans had done it on a smaller scale. Billy himself had tried it on about one-fifteenth of the scale in the July fighting on the Marne. But the air attack that he launched as part of the American advance in the Meuse-Argonne between September 12th and 16th, 1918, was the first massed air striking power ever seen. Until then, the air fighting had been chiefly between individual pilots. With his mind full of what stronger, more coordinated numbers might have accomplished around Château-Thierry in July—with the successful bombing of the enemy supply center at Fère-en-Tardenois as an encouragement—he sold Pershing and the Allied High Command the idea, and early in August began assembling a force of 1500 combat planes—American, French, British, Italian, Belgian, Portuguese—every kind he could get his hands on. When the American ground forces—400,000 strong — struck, Mitchell struck ahead of them through the air.

In relays of 500 planes at a time, he hit the Germans' St. Mihiel salient on one flank, then on the other, then

on both, then cut around both flanks, and hit them in the rear—the first attempt to apply the theory of "the isolation of the battlefield."

In one instance, Billy reported that 170 of his planes defeated a German counterattack by themselves. The accuracy of the enemy's artillery was repeatedly upset by the destruction of Ludendorff's observation balloons, a specialty of the American ace, Frank Luke, until he was killed. This was a reversal of the picture of recent months when it had been our own balloon observers who had had to bail out of their baskets three or four times a day with the burning bags collapsing above them.

° ° ° ° °

In September, Mitchell assured General Pershing that the enemy could no longer carry out reconnaissance missions over our lines. In World War II such a promise would have been impossible even at the most victorious moment. The great speed of World War II photo reconnaissance planes on both sides, operating at altitudes of 35,000-45,000 feet, made it impossible to intercept them surely even after the otherwise complete attainment of air superiority. Billy's promise to Pershing, however—who seems to have been convinced at last by the significance of his own air reconnaissance in the campaign, and therefore was anxious to keep enemy aerial observation away—was apparently justified.

After the war, Mitchell loved to tell the story of how he was walking toward his headquarters with Pershing himself one day when a German observation plane did appear at about 20,000 feet, miles behind the Allied Front. Pershing said nothing, but his face took on a look of concern. Our troops were starting to move into the big push, so far, it seemed, without the enemy's being aware of it. Mitchell knew, of course, that anywhere from two to six of our own Pursuits would be up to head off the intruder, but instead of saying so to Pershing, he waited until they reached his office. Picking up the telephone, he called an operational field and "ordered" that Pursuits be dispatched to intercept the German plane. Almost before he could hang up, the phone rang back. Billy took it, and turned nonchalantly to General Pershing. "Enemy reconnaissance plane going down in flames five miles southwest of Chaumont, Sir," he said. "Care to step out and look?"

° ° ° ° °

Billy Mitchell was on top of the world at that time (November, 1918). In his headquarters at Souilly, it was plain that the stories about Brigadier General William E. Mitchell had not been exaggerated. Laughing and constantly talking, wearing that blouse with the outsize patch-pockets and the famous pink breeches (the decorations that dazzled Washington were not in evidence, though his sister said later they were in his pockets), Billy practically held court. American, British, and French airmen—and generals—streamed in to see him. The flyers around him would have done anything for him, and so would the boys out in the squadrons. On the night of the Armistice in Paris, he

had to be rescued by the police from a joyful mob of French pilots cheering, "*Vive nôtre Général Américain.*" Billy was clearly the Prince of the Air now as the Prince of Wales (whom he shortly took for a ride in his plane without anybody's permission) was the heir to the throne! He had his personal planes, two automobiles—one a gift from the French Government, the other a rakish Mercedes said to be the fastest car in France, which he drove himself at breakneck speed around the countryside with his chauffeur sitting behind—he had two American aides (the outstanding combat airmen Winslow and Haslett, both of whom had been shot down and captured, rejoining him after the Armistice)—and he had a French aide. All were kept busy. Upon meeting a French officer, Billy would start his enthusiastic French, run out of French words, and without pausing, continue rapidly in English. But in whatever language he spoke, everybody seemed to understand him. Not only airmen like Trenchard, who had called his Meuse-Argonne offensive "the most terrific exhibition I have ever seen—you have cleaned out the air," but Allied ground force officers listened attentively as Billy expounded Air Power.

Mitchell received Pershing's tacit approval before November 11th arrived for a very special project of an even greater concentration of Allied airplanes than the September force. It was to include night bombers for day operations and was to see the beginning of a heavy bombardment offensive against Germany's homeland. Had Metz held out, he had prepared in detail plans for an operation which called for the dropping of a strong part of the 1st Division behind the German lines by parachute. That operation, as it was worked out, was a complete example of modern paratroop tactics, long years before the Germans, Russians, or British even thought of them.

In a sense, for Billy, the Armistice was an untimely interruption—as if the whistle had ended the game just as he was about to go over the goal line.

Watching him and listening to him, I realized how much we needed him back in Washington. There, a different kind of war was going to continue. . . . There would be a new Chief of Staff in Washington now, and of course it would be General Pershing. Following the tradition of all returning battlefront commanders, he would certainly bring his own staff to the War Department. The Air Service needed Billy back home, fast, and with every argument I could muster I tried to convince him of this fact.

Why shouldn't he capitalize on his war record and be the new Air Chief? Could he swing it with Pershing, I asked him. Taking off the necessary percentage which one had always to subtract from Billy's enthusiasm—for instance, the "destroyed" railway station at Metz-Sablon was still in good shape when I saw it, the trains running in and out on schedule—there was still nobody who could possibly move into the Air Service job at home in the way General Mitchell could and

undoubtedly would. He, above all others, had the background, the reputation, the personal courage, the knowledge of air operations to do the job. He should be the Chief.

Billy smiled and said, "No." At least, he insisted firmly. "Later. My boys are going into Germany, and I'm going with them. I want to see this thing through."

He wanted to drive that fastest Mercedes in France down Unter den Linden.

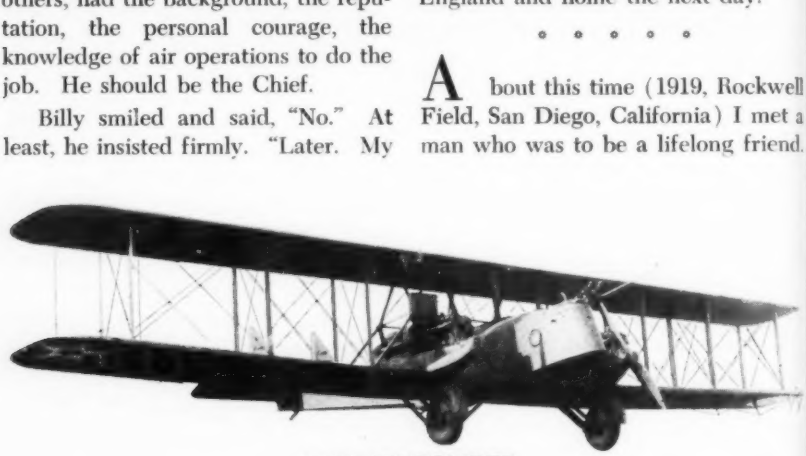
I said good-by, and while he and Tommy Milling prepared to go to Germany via Belgium, I went back to Paris for a few days before returning home.

About two nights before I was scheduled to leave, the phone in my hotel room rang with a long distance call. It was Billy calling from a small town in Flanders. "Listen," he said, "as soon as you get back there, have orders issued getting me home. I want to get home as fast as possible. Right away. Can you do that?"

I thought I could. Something must have changed his mind up there. "O. K., Bill," I said, and started for England and home the next day.

* * * * *

About this time (1919, Rockwell Field, San Diego, California) I met a man who was to be a lifelong friend.



MARTIN BOMBER

Used by Gen. Mitchell's crews, it presaged a new concept in the art of war.

One day my Adjutant came in and said, "Colonel, there is a man down at Ream Field whose conduct has been so bad it requires your personal attention." I asked who this man was. "Chap by the name of Doolittle," replied the Adjutant. "Second Lieutenant James H."

It seemed that Doolittle, Second Lieutenant James H., had been sitting in front of a hangar, bored. Another pilot was about to practice landings and take-offs. To the man sitting beside him, Doolittle said, "I'll bet you five bucks I can sit on his landing gear while he lands." His friend laughed, but on seeing that Doolittle was serious, quickly took the bet. Doolittle approached the unsuspecting pilot and asked if he would take him up for a ride. The pilot replied, "Sure, hop aboard." But as soon as they had leveled off in the air, the

pilot's good nature was turned to consternation as he saw his passenger climb down to the lower wing then underneath to seat himself on the cross bar between the fixed wheels of the landing gear. Nothing he could shout through the roar of the engine seemed to reach Doolittle; none of his frantic gestures attracted Doolittle's attention. There Doolittle sat until the sweating pilot had to land. When the plane rolled to a stop, Doolittle walked over to the group of open-mouthed spectators and said to his friend, "Pay me."

I knew there was only one sort of punishment that would impress that kind of man, and I grounded the chap by the name of Doolittle for a month.

The officer most responsible for the progress of the Air Service, for maintaining the interest and morale of its personnel in those lean years, was General Billy Mitchell. He was badly disappointed when he came home from Europe and found he was not to command it and that he was to serve as Assistant Chief of Air Service and Director of Military Aeronautics, under Major General C. T. Menoher, a former commander of the 42nd (Rainbow) Division, who had been appointed, without any aviation experience or qualifications, Chief of the Air Service in December, 1918. Mitchell at once began the running battle which was to increase the air arm's vitality and lead, in the end, to his own elimination from the Army. By the middle of 1919 he had been instrumental in setting up a series of projects which quickly began to snap our pilots out of their doldrums and put them on their toes, develop the possibilities of the airplanes and their crews, and attract a certain amount of popular attention. They also began a new pattern of national usefulness in peacetime.

In June, 1919, my job as District Supervisor of the Western District was abolished and I was ordered to San Francisco on the staff of General Hunter Liggett where I was given charge of all aviation in the western part of the United States. I was happy to serve under General Liggett, who had commanded the First Army in France, for I had known him years before.

We were trying to find ourselves during this period—trying to find out how the airplane could be used and what value it might be to the public. Out on the West Coast we carried on an innovation strictly our own. That was aerial Forest Fire Patrol. I set it up in June, 1919, and it was continued by the Army Air Service for some years until the Forest Service was able to take it over with planes rented from civilians. We made air patrols over the forests in the West from the Cascade and Olympic Mountains, along the Sierra Nevada and Coast ranges down to the Sierra Madre. Our purpose was to find out if the airplane could detect and locate fires and direct the fire fighters in their suppression work. The Forest Fire Patrols operated from bases in the valleys and flew over mountain peaks and the high points in the ranges. This service not only reduced the actual fire damage in the timberland to a marked degree and thus saved

millions of dollars in timber, but it also accustomed our pilots to some of the most difficult cross-country flying in the world.

In the fall of 1919, Mitchell, in order to stimulate interest in aviation and open up airways across the country, made plans for the first transcontinental air race. This was not a mere sporting event, any more than was the later speed competition for the Schneider Cup, which ultimately led to the creation of the Spitfire, so effectively used in the Battle of Britain. Although an Army Air Service affair, the transcontinental race was, in fact, the foundation of commercial aviation in the United States.

Prior to that, there were no established air routes, no communications facilities, no system of linked air bases in this country. Not a single commercial air line was in operation. Our little five-mile hops with the first air mail from Nassau Boulevard to Garden City, New York, in 1911, had suggested that someday mail might be carried in planes. The Washington-to-New York air experiment started in 1918 was an effective attempt by the Air Service to give the Post Office Department a shot in the arm. After the Armistice, several hundred independent pilots had bought war surplus Jennies and DH's and had started barnstorming around the country, offering rides and participating in local fairs and air shows and trying to start small businesses of one kind or another, but they had no organized contact. They flew anything and anywhere to gain an honest dollar, but followed no regular cross-country routes.

It was always Billy Mitchell's idea that aeronautics could establish air bases and airways anywhere in the world, and that wherever air power could operate it could dominate sea lanes against navies, land areas against armies, and connect various population centers, even the most inaccessible points, with rapid lines of communication. He felt that if military airways were set up to pave the way, commercial air expansion would quickly follow with a resultant exchange of passengers, goods, and services.

Early in 1919, he had prophesied in the magazine *Air Service* that in another few years commercial air passengers would be as familiar a sight as travelers on trains; that distances between, say New York and Chicago, would be figured in terms of hours, not miles. . . .

The race demonstrated that it was possible for airplanes with average pilots to fly across the United States, regardless of topographical features, if suitable bases and communication facilities were available and proper navigational aids employed. It also paved the way for what later was to be the air-mail service across the continent, though until 1923, the air mail traveled by plane only in the daytime, being transferred to trains at night. In 1919 and 1920, however, as increased acquaintance with airplanes and wider experience with cross-country navigation built up confidence, Air Service officers were

already regarding night flying as a necessary qualification for all pilots.

Prior to the transcontinental race, Mitchell had sent Lieutenant Colonel R. S. Hartz and Lieutenant E. E. Harmon and their crew in a Martin M-2 bomber around the boundaries of the United States, a distance of 9000 miles. Such flights as Hartz's and those of the transcontinental flyers fired the imagination of our pilots and made flying a practical affair. . . .

Another operation that kept our airmen busy was the Border Patrol, started by Mitchell. The troops along the Mexican Border had not yet disbanded. Villa's raids had not been forgotten and there were still petty disturbances. To help the Internal Revenue Department prevent illegal crossing of the Rio Grande—in those desolate wastes a walking man could be seen for miles from the air—and also to maintain a show of military force, the Air Service set up a regular patrol from Brownsville, Texas, along the Rio Grande to El Paso, and then westward, following the border to San Diego. Our airdromes were located in little towns along the route about 150 to 200 miles apart. The patrols flew twice daily, both eastbound and westbound.

Operations along these hundreds of arid miles soon proved at least as toughening for the pilots as the missions over the mountains on the Forest Fire Patrol. We learned a lot of things the hard way, especially regarding navigation and the need to secure accurate flight plans before taking off. Our staffs learned the mechanics of supply and administration for small units covering areas of 2000 miles. For instance, my own domain extended from a point in Arizona along the Mexican Border to San Diego, and then north for 1400 miles to the Canadian Border.

It was in connection with the Border Patrol that I first saw Billy Mitchell after his return from Europe. He flew down to the Border and ended up at El Paso just to see how things were getting along, and on the Fourth of July, 1919, I went down there to meet him. I remember the exact date very well because it was the day an almost unknown heavyweight named Jack Dempsey took the championship away from the giant Jess Willard in less than four rounds.

Our host was a tough, bewhiskered old Cavalryman, Colonel Tommy Tompkins, who expressed admiration for the air Border Patrol, and said what a good thing it would be if we could fly right across the Border down to Chihuahua, Pancho Villa's own province, to take a look at the new trouble which was rumored to be stirring up down there at that moment.

Without waiting a second, Billy Mitchell said, "Well, come on. What are you waiting for? Let's do it!" Tommy Tompkins was a Cavalryman from his misshapen campaign hat to his boots and spurs. He loved to ride the plains, patrol the Border, and run down renegades, but this abrupt defiance of international protocol apparently horrified him for a moment. "Why, we can't do a thing like that," he exclaimed. "The hell

we can't," said Billy. "Come on, let's get moving. Here's the airplane."

Billy piloted the plane himself. I can still see old Tommy Tompkins with his whiskers blowing out from both sides of his face when he took off on his first, and perhaps his only, airplane ride — one that was completely against regulations. . . .

I could see a change in Billy Mitchell that summer. He was sharper, more alert than ever. I knew him well, and I could see he felt his office in the War Department was not the gay, triumphant headquarters he had had in France during World War I. Billy had always been an eager preacher of the possibilities of air power, but now his experiences in France and perhaps the things he was encountering in Washington had given him an undercurrent of angry impatience. He seemed to brush aside the possibility that a lot of people still might not understand his theories, and he could not be convinced that air power was not being blocked by deliberate and well-organized enemies.

Billy said it was primarily the Navy, the entrenched Admirals "unable to face the fact that sea power was done for." Old-fashioned generals in the War Department were a big part of it, too. Billy's feeling about profit-seekers at that time was largely directed against the heavy industries behind the battleship. His main thought when I saw him in El Paso that summer seemed to be to show them—with activities, like the transcontinental air race, the Border Patrol, the Forest Fire Patrol, and now with a mass flight to Alaska and a mass flight around the world—and above all, to sink those damned battleships!

Again and again, he pressed for a chance to show the Navy and the world what airplanes and bombs could do to the best battleship ever built. The United States Navy then had some of the former German warships in its possession, including the big battleship *Ostfriesland*. They were no good to anybody, but would the Navy give the Air Force a chance at them? "Hell, no!" said Billy, with a grin on his face. "Can you guess why? Well, we'll see. Keep going the way you are. We're going to get them and we're going to sink them."

Soon after I got back to San Francisco he wrote me again: "I am very anxious to push through this flight to Alaska with land planes. Better get oriented along that line as to the possibilities from your department north. This might develop into a round-the-world flight."

In the summer of 1919, Assistant Secretary of War Crowell headed an investigating board to go to Europe and look into the various air organizations and make recommendations about what we should do in the United States. On its return, the Board was so inclined toward Mitchell's views that Admiral Benson, Chief of Naval Operations, was stung into telling Howard Coffin, one of the Crowell Board members, that he was wasting his time, and "furthermore," Benson said, "I cannot conceive of any use the fleet will ever have for aircraft." Later the Admiral told Mr.

Crowell, "The Navy doesn't need airplanes."

When Billy Mitchell learned that Admiral Benson was about to issue an order abolishing the Naval air arm, it was right down his alley. However, he didn't have a chance to say much, for the Assistant Secretary of the Navy, Franklin D. Roosevelt, immediately came out with a statement that it wasn't so, and anyway, if it were so, he hadn't heard about it. Mr. Roosevelt, whom I had known slightly in Washington during World War I, and whom I was to know in far closer friendship some twenty years later, felt very differently about the air arm.

When he was asked by Senator Wadsworth, Chairman of the Military Affairs Committee, if it might not become the principal factor in the Navy or the Army, Mr. Roosevelt replied, "It might conceivably, in the Navy, become the principal factor. I don't know whether the Chief of Naval Operations will agree with me, but I might say that later on, in the future, aviation might make surface ships practically impossible to be used as an arm."

Those who visited Billy Mitchell in his office in Washington those days were immediately led to a globe, and Mitchell would run his finger from Alaska down to Natal, off the coast of Brazil, then up to the islands at the mouth of the St. Lawrence River. He would tell all who would listen to him or read what he wrote, that air power made these locations "the three-pronged suspension of our real national defense;" that other fortifications, including the Navy, were obsolete.

He wrote articles on the subject for magazines, and before a Senate committee in October, 1919, with one of those impetuous but somehow accurate gestures that were so characteristic of him, he even changed the third point — the mouth of the St. Lawrence River—and shoved his finger across the Atlantic to Iceland. On this occasion, as was happening more and more often, he lashed out with one of those impatient criticisms which, like a ringmaster's whip, would crack at some complacent performer in the government who, until then, had never thought of himself as having anything to do with air power. This time it was the State Department.

In 1916, Grinnell Land and Grant Land, originally discovered by our American General Greely, had been traded to Denmark for the Virgin Islands. "Had the advice of any airman been sought when this transaction was taking place," Billy told the Senate committee, "decided recommendations would have been against giving up this land which would form an ideal air base for commercial air traffic to Europe and Asia in case of war."

The first flight to Alaska, under command of Captain St. Clair Streett, took place in July, 1920, starting from Mitchell Field, Long Island, New York, in DH's. It was a great achievement for that day, and in those airplanes, for any day. It may seem strange that, two years after the war, this top priority mission was entrusted

to the same old DH's that had been the subject of so much criticism during the war.

Despite Mitchell's hammering on the theme that aircraft, especially a military aircraft, became obsolete the minute one began to build them, no one in authority from the President down to the War Department, nor members of the Congressional or Senate committees, paid much attention to Billy's warnings of the danger of the static equipment situation then existing.

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Billy Mitchell came out to the West Coast in 1920 to attend the American Legion Convention and, as usual, the ovation that greeted him was tremendous. A flight of 24 Navy planes had also headed for the celebration at San Francisco, but because of bad weather, were spread all over California. To the newspaper reporters eagerly waiting for just such a remark, Billy cracked, "What more can you expect from the Navy than that?"

Nevertheless, the naval allies who came to Mitchell's side in this argument that was rapidly becoming a battle were surprising. Not only Admiral William S. Sims, our own brilliant C. in C. in European Waters in World War I ("The average man suffers very severely from the pain of a new idea. . . . It is my belief that the future will show that the fleet that has 20 airplane carriers instead of 16 battleships and 4 airplanes will inevitably knock the other fleet out.")—not only Americans like the great naval inventor Admiral Bradley Fiske, and quite a few others—but some of the very fathers of the battleship in Britain spoke out as if they themselves were airmen. . . .

So Mitchell's fight with the Navy over the battleships was not just a simple fight between the Army, the Navy, and the little Air Service. It was really a battle of ideas, involving air-minded people and non-air-minded people in both services. But Mitchell's constant use of the press to put his ideas across oversimplified the question. His hot pressure to get a crack at sinking the German battleships, and the extreme opposition of such key figures as Secretary of the Navy Josephus Daniels made it seem like a straight fight between the Air Service and the Navy. A lot of people never realized that we were finding more of an obstacle, or at least just as much of an obstacle, in the Army itself. Our Chief, General Menoher, was not only unable and wholly unwilling to cope with Mitchell's ideas, but he could not handle Billy Mitchell. Also, to make matters worse, he did not fly much.

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In June and July, 1921, Mitchell finally did bomb battleships. The story has been told a thousand times by now, but the page of history that was turned still can't be overemphasized.

On every sort of pretext, all kinds of people had tried to stop the tests. Strong pressure was brought to bear on President Harding and on Congress to withhold permission to designate the German ships as targets and

thus block the experiment. But Mr. Harding liked the way Billy Mitchell did things, or in any case sensed, with a good instinct, Billy's appeal to the American public. Mitchell said, after the President's death, that one of the things Harding had promised to keep at the top of his list as he left on that last fatal journey to Alaska, was the matter of air bases up there. Also, Billy had many friends in Congress.

Former Secretary of the Navy Daniels didn't try to stop the tests at the end, but on behalf of the Navy flared forth unequivocal defiance. He said he would stand bareheaded on the bridge of any battleship during any bombardment by any airplane, by God, and expect to remain safe! He only regretted that the eager airmen could not be allowed to attack under actual combat conditions to learn how fast the would-be bombers would be shot down by battleships in a real war.

Instead of this blast of the ex-Secretary's having a merely rhetorical effect, it at once made the pilots in the Air Service besiege Mitchell with the request that the Navy be allowed to shoot back at them while they sank the battleships.

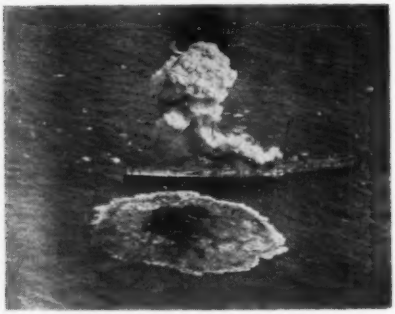
"Let's do the thing right," they said. It was probably the closest thing to undeclared civil war since the Whiskey Rebellion in my home state in 1791.

Of interest, and in contrast with the enthusiasm of Billy's boys at Langley at this point, was the attitude of the nonflying chief of the Air Service. Only twelve days before the long-awaited tests were to begin off the Virginia Capes, General Menoher, exasperated by Billy's uninhibited remarks to his newspaper friends, made the request to Secretary of War Weeks that Mitchell be relieved from his job. Mr. Weeks probably would not have minded such a change very much. However amiable the President might be about it, the Secretary, privately, was getting fed up with Billy's activities and complained to Washington correspondents that Mitchell "had greatly annoyed the Navy on numerous occasions." But nobody in Washington, least of all Mr. Harding's Secretary of War, wanted to tangle in the open now with the popular Billy Mitchell. At the first rumor of the relief from command, the press roared, practically unanimously, that maybe other changes were needed instead. Menoher, for example, was the "spokesman of the Army and Navy conservatives." General Mitchell was being persecuted, not only for his up-to-date ideas, but more especially for his pressure for a unified Air Force.

Mr. Weeks, as he was getting into the habit of doing, reprimanded Billy once more for his undisciplined way of saying things, and prevailed upon General Menoher to withdraw his request.

Sixty miles off the Cape Charles lighthouse the Atlantic Fleet began to assemble. The majestic new battlewagon *Pennsylvania* led the show, with even the old *Olympia*, Dewey's flagship at Manila, looking on as the reminder of a great tradition. In the center of the floating arena, about two

THIS IS HOW IT STARTED



Gen. Mitchell's bombs searing the unsinkable OSTFRIESLAND 0839 hours, 21 July 1921.

ADMIRALS' DILEMMA

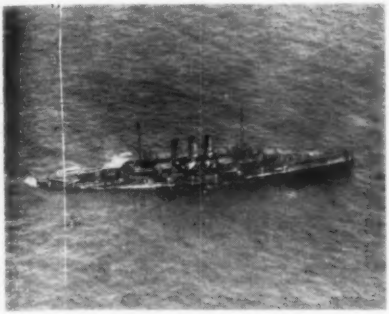
Naval inspecting party pulls away from the wounded OSTFRIESLAND, 1115 hours, 21 July 1921. Army air observers in blimps survey the historic proceedings below.

miles from the nearest spectator ship, was the target area. There were to be all sorts of arbitrary rules limiting the number of direct hits with certain bomb weights and permitting interruption of the bombing while an official board from the U.S.S. *Shawmut* went aboard the target ships at will to inspect the damage. But the gist of it was that, following attacks by assorted Army, Navy, and Marine Corps planes on a series of lesser surrendered craft, the *pièce de résistance* would be the former pride of the Kaiser's High Seas Fleet, the mighty super-dreadnaught *Ostfriesland* herself.

Official international observers on the U.S.S. *Henderson* didn't watch the performance any more closely than we did out on the West Coast and from every air station in the country. First, the German submarine U-117 went down almost too quickly to count, on the 20th of June. The zealous training time of Mitchell's boys on the hulk of the old *Texas* in Chesapeake Bay had been well spent. Navy fliers hit the radio-controlled *Iowa* with dummy bombs on the 29th, scoring only two direct hits, but strongly reviving the unhappy discussion of the Navy's effective off-the-record trials on the *Indiana* with live bombs a short time before.

The Navy had kept the results of that experiment a secret. Mitchell and a few others had pulled it into the open after pictures of the battered *Indiana* had appeared, without identification, in England. In the same way, sixteen years later, Bob Olds' beautiful pin-pointing of the U.S.S.

THEY SAID IT COULDN'T BE DONE



The OSTFRIESLAND, a martyr, settling fast, 1235 hours, 21 July 1921.

EVERYBODY KNOWS HOW IT ENDED

The OSTFRIESLAND bows out, 1239½ hours, 21 July 1921.

Utah off the California coast in 1937, through bad weather, and the bombing of her decks with water-filled bombs, was to remain a matter of Navy "security."

On July 13th, the official and most skeptical observers on the *Henderson* saw the German destroyer G-102 sent below the waves with alarming ease. On July 18th, the cruiser *Frankfurt* was the anchored target. The first attack of the Navy planes and Army aircraft carrying light bombs raised the hopes of the Admirals and their Army friends. Then Captain W. R. Lawson appeared, leading six Army bombers loaded with 600-pounders. But he was made to stand by, circling around, while the observers from the *Shawmut* went aboard the *Frankfurt* to inspect the earlier damage. There was talk now of sinking the *Frankfurt* with Navy gunfire—the only thing that enthusiastic Navy officers said could do it.

Meanwhile, Captain Lawson was getting impatient and he radioed: "Must begin bombing in fifteen minutes; fuel limited." The observers retired from the target ship to watch while the Navy guns were made ready. They were never needed. After Lawson and his planes had finished bombing, the *Frankfurt's* main mast snapped, the bow settled. Eleven minutes later she dived out of sight.

But it was the battleship *Ostfriesland,* veteran of Jutland, the unsinkable dreadnaught, that was the main thing. Not only the press, uniformly on Mitchell's side, but other factors had heightened the public's interest

in the fate of the *Ostfriesland*.

The first attempt then came on the evening of July 20th. Not understanding the rules limiting him to 600-pound bombs, the observers off the Virginia Capes thought Mitchell had failed because he did not sink the ship. It was no more than they had expected! The former German flagship had four separate skins of steel and every sort of unsinkable bulkhead. During the war she had not only withstood the heaviest naval gunfire in the Battle of Jutland, but had made port after a mine had exploded directly under her.

The weather off Hatteras was inclined to be rough and some of the observers had become seasick. General Pershing and Secretary of War Weeks did not think it worth their while to return the next day. Thus it was that, sitting comfortably ashore the following evening, they only heard the distant rumbling of the explosions as the *Ostfriesland* went down.

Rules or no rules, Billy Mitchell had been out to sink that battleship. His second attack, with eight Martin bombers in the morning, had flared up feelings on both sides. As the column MB-3s appeared, led by Lt. Clayton Bissell and carrying two 1,000-pound bombs apiece, Billy and his observer, Capt. St. Clair Streett, were circling over the *Ostfriesland* for a front-seat view. From 2,000 feet Bissell's first bomb scored a direct hit on the battleship's forecastle. At once "frantic cease-fire signals went up from the *Shawmut*." Disregarding them or believing themselves within their rights, (there was a formal hearing about it later) Billy's boys let go with four more before they obeyed. Two more direct hits—and two near misses exploding beneath the surface in those hull-wracking "water hammer" blows that Mitchell was banking on as much as the bull's-eyes. While the Martins, with more than half their bombs still unreleased, flew around the shaken ship, again wasting precious fuel, the official inspection party on the *Shawmut* chugged once more to the *Ostfriesland*. It was later reported that when Captain Johnson, the naval officer in charge of the tests and of the naval aviation participating, saw the damage the few bombs had done, he cried: "By Jove, we are not going to sink this ship!" With their gas getting lower every second the flyers were ordered to return to base and await further instructions. Pretty mad themselves by now, the boys, ignoring the standing order to jettison unused bombs well out at sea, "swooped within half a mile of the warships" and dropped their remaining 1,000-pounders uncomfortably close to the Atlantic Fleet. Billy followed them back to Langley. Although the word was passed that he would be given one more chance, the *Pennsylvania's* 14-inch guns were made ready again for what the Navy people and some of the correspondents on the *Henderson* figured would be the real finish. A few experts thought nothing but the wrecking party standing by on the *North Dakota* with depth bombs could actually sink her.

Not so the old hands. Billy's press

and Congressional friends and the handful of Army and Navy officers who wanted to see him win, had not only been briefed till it was coming out of their ears, but had felt the vibrations as the cruiser *Frankfurt*, herself a survivor of Jutland, had gone under. They understood the depth charge effect of the near misses, and Mitchell's disgust with the rule that only direct hits could be counted. They also understood that Billy didn't care about scoring "points" at all. The day before, from the *Henderson*, Clinton Gilbert, one of the correspondents who had known Billy since the days in France, had written: "The rules were established to show the Navy what the effect of the bomb on a battleship would be. Mitchell was solely interested in proving that he could sink a battleship."

The old Billy Mitchell hands also knew, as did the Navy judges, that Billy, as usual, still had a trump card to play. Until now the heaviest aerial bomb in existence had been the 1,100-pounder. For ninety days, Mitchell, with the enthusiastic co-operation of General C. C. Williams, the imaginative Chief of Ordnance, and three officers of Williams' staff—Major W. A. Borden and Captains C. H. M. Roberts and S. R. Stribling—had been pushing the construction of a new type of bomb, "new from the ground up," to weigh in its two sizes, 2,000 and 4,000 pounds. Like the experimental eight-gun and .37 mm. armament that Billy got General Williams and the inventor J. M. Browning to help him with during the Twenties, these bombs were, in basic design, the same we were to use against Germany and Japan in World War II. Even if it had been ready, there was scarcely much chance at that time of delivering the two-ton monster on the *Ostfriesland*. But despite the short space for preparation, the 2,000-pounder was not only ready, but a weapon in being. As the watchers in the Fleet waited to see what would happen next, back at Langley eight airplanes, six Martin B-3s and two Handley-Pages, stood lined up, waiting—each with a bomb hooked on to it that was twice the size, and carried twice the load of TNT, ever dropped (for effect) from the air before.

At 10:30 A. M. Billy had just finished briefing his boys for the last time ("Try for near misses!") when final word came from the control ship. He would proceed at once to the target where he would be permitted two direct hits with the heaviest weapon in his possession. But he would *not* carry more than a maximum of *three* of the new 2,000-pounders! That, as Billy himself wrote later, "was the last straw." He had been convinced all along that "the Navy (had) actually tried to prevent our sinking the *Ostfriesland*." The boys, again led by Lawson, were told to take off, all eight planes loaded with the big bombs despite the *Shawmut's* order. As Billy and Streett flew after them over the Atlantic a radio message was sent to the Fleet: "Martin Bomber and Handley-Page formation with 2,000-pound bombs have taken off from Langley Field and are now proceeding to target. In case of failure to secure two direct hits subsequent attacks will be made until we have

secured the two hits the Army is authorized to make."

"I heard nothing further from the Navy," Mitchell said afterwards. Perhaps there wasn't time. Certainly the famous aerial newsreel shots of the sinking itself make it seem (they are shown, from time to time, to this day) one of the fastest military operations on record. In point of fact the entire business, from the time the first bomb dropped until it was over, took exactly twenty-one and a-half minutes. Flying a "V", the formation arrived over the battleship at 12:05 P. M. There were only seven of them now. One of the Handley-Pages, ironically the one carrying Captain Roberts, co-inventor of the new bomb, had to ditch in the sea. Ordinarily this story, involving considerable heroism and a hairbreadth escape for all aboard, would have made headlines. So intent were the newsmen on the action now taking place in the target area, however, that it never got into print at all until Levine's book was published twenty-two years later. First the boys, flying at 2500 feet, broke into column and passed in review before Billy's observation plane with its identifying blue pennant streaming out behind (nobody in the world could lay on a better show than Billy Mitchell could, and nobody loved one better!). Then they turned and started their bomb run.

The first two-thousand-pounder went down in a near miss that hit 100 feet off the *Ostfriesland's* starboard bow. There was "a muffled roar, a great splash of water, an ascending cloud of black smoke," and 5,000 yards away on the *Henderson* the reporters felt the vibration of "a terrific under-water explosion." In less than two minutes a second giant bomb, three hundred feet ahead of her bow—another shivering water hammer blast. "Three thousand feet above," noted Billy eagerly, "we felt the rush of air as it bumped the wings of our plane."

The rest is history. At 12:24 the third one-ton missile hit her starboard armor "a few feet aft of the bow, then glanced off and exploded in the water." The *Ostfriesland* "lifted slightly in the water, then settled back." There was "a terrific burst of fire and smoke and a great hole in the starboard side of the forecastle." The fourth giant bomb "hit on the port side abreast the mainmast;" the fifth struck about "25 feet off the port side near the waist turret." Her bow lifted out of the sea (overhead Mitchell and Streett agreed it was too bad she wasn't under steam with her magazines filled) and though she now "rolled uneasily, plainly hurt," with a jagged hole in her hull exposed to view, once again she settled back. She was "still shedding the mountain of water when the sixth bomb was dropped at 12:31 off the starboard side. The detonations lifted her stern high. As it fell there was a sharp list to port. Cries were heard: 'She's sinking!'" Listing more steeply, she started to keel over. "She rolled there," wrote Lieutenant Parker, the Navy flyer reporting for *The World*, "like some immense round helpless sea animal, her bow lifted still higher and her stern swung downward."

And then, before the bugged eyes of votaries and critics alike, von Tirpitz's unsinkable super-dreadnaught was gone. On the *Henderson* "An old officer," recalls the historian Roger Burlingame, "put his arms on the rail and his head in his arms and wept." As Billy Mitchell swooped down to within a hundred feet for a farewell look, the Handley-Page, as a *coup de grace*, dropped the last 2,000-pounder into the circles on the empty sea.

Within a matter of hours the Navy had protested against Mitchell's tactics. The protests, however, were drowned in the wave of headlines. Billy Mitchell had proved it! His bombers had done what he said they would do! Aboard the *Henderson* General Williams, justly regarding it as a triumph for Ordnance as well as Air, had told the reporters: "A bomb was fired today that will be heard around the world!" General Snow, Chief of Field Artillery, stated: "The percentage of hits was equal to, if not greater than, that of heavy artillery at long range. Better still, their range was from 100 to 200 miles off shore, instead of 15 or 20 miles only." Glenn Martin, Howard Coffin and General Menoher ("A cold fact has been demonstrated. That fact is that the battleship can be sunk by the aerial bomb") all bore excited witness. Admiral Fullam, far from joining in the sobs and protests of other Naval officers, again furnished a quote, as well as proof of his understanding. As the *Ostfriesland* floundered in her final agony, "a ranking colleague" asserted to him that the battleship's protective deck had not been pierced and would still save her. Admiral Fullam was heard to reply that the famous deck was "already beginning to protect as much of the ocean bottom as it could cover." But it was left to our own chief, General Menoher, to make the really historic remark. While Secretary of the Navy Denby and the officers around him stood in stunned silence watching the *Ostfriesland* disappear, some of the newsmen heard Menoher say to him: "I guess maybe the Navy will get its airplane carriers now."

As the news flashed across the country everybody throughout the Air Force, down to the loneliest little weather station, celebrated. At Langley they put planes in the air to meet the returning bombers, saluting guns boomed from the ground, every man, woman, and child on the base was down on the line as the boys landed. Congratulatory telegrams came from General Menoher and, of course, from Secretary Denby, doing the right thing—to Billy, to "the entire Air Brigade!" Out in California I wondered whether Colonel Tommy Milling, who had been Mitchell's executive for the whole operation, remembered that first bombsight of Riley Scott's back at College Park. But maybe he didn't because everybody in the Air Force was looking ahead that night—not back.

So were two other gentlemen, who were neither airmen nor citizens of the United States. The Honorable G. Katsuda, of the House of Peers, in Tokyo, (write Emile Gauvreau and Lester Cohen) was "polite and communicative and had been doing an

excellent job of making a good impression on American editors and chambers of commerce." During the bombing he and his traveling companion, the Honorable G. Shibuta who represented the Kobe Chamber of Commerce, had "kept four powerful cameras clicking," and Mr. Katsuda himself had held a stop-watch. As the *Ostfriesland* turned on her side their usually impassive smiles had faded and Mr. Katsuda had chattered excitedly. Daniel Bidwell of the *Hartford Courant* "erstwhile passenger on Henry Ford's peace ship, globe trotter of note and an ardent believer in Homer Lea's prophecies of a Japanese invasion of the United States," had kept one eye on the sinking battleship and the other on the two Gentlemen of Japan. Presently he went up to the diplomatic visitors and asked them what they thought of it. "Very great experiment, profoundly exciting," beamed Mr. Katsuda. "I must put in cable for very great Japanese newspapers as eye-witness. Very fortunate to be here. Our people will cheer your great Mitchell and, you may be sure, will study his experiments. We respect American inventions. There is much to learn here."

Gauvreau and Cohen say that Mr. Shibuta agreed with bows "as he wrapped his precious camera in a large silk handkerchief."

In August, 1921, the International Conference on the Limitation of Armaments convened in Washington. Mitchell was the American air representative. At that particular moment the Joint Army and Navy Board issued its findings in regard to the bombing tests. There were editorial comments of the fact that this report did not bear the signatures of several members of the Board of Army and Navy officers who had prepared it, but was signed only by General Pershing. The report stated that nothing conclusive with regard to air power had been proven. Planes were a valuable auxiliary, but not to be depended upon by themselves. The battleship was "still the backbone of the fleet and the bulwark of the nation's sea defense."

The press and members of Congress snorted at this verdict.

Then suddenly, somehow—no one quite knew how—a report of Billy Mitchell's, believed to be safely pigeonholed in General Menoher's confidential files, was published throughout the entire country. It mentioned no names, but it tore the battleships, the Admirals, and the Pershing report to shreds. General Menoher resigned as Chief of the Air Service.

For a few days there was excited newspaper speculation over whether Billy would now be completely vindicated by being appointed to succeed Menoher. I will state here that no one in the Air Service (except some of the younger pilots) believed such a thing was possible, though we all hoped that it might be. Following General Menoher's request to be relieved, Mitchell, in view of the circumstances, offered his own resignation, but no one took that very seriously.

On October 5th, a couple of weeks

after Menoher stepped down, General Mason M. Patrick was sent for again. Pershing's classmate, the old A.E.F. Commander, was again in the saddle. He was not a pilot, though he presently acquired wings during a trip out to the West Coast. But the newspapers all noted that he was Mitchell's friend and former boss—an experienced friend of air power.

We all recognized that the new Chief's experience with air power was a secondary consideration in his appointment. In the eyes of the General Staff, it was experience with General Mitchell that counted. If there was any officer in the Army who should know Mitchell's way of doing business and be able to control him, Patrick was the man. Indeed, according to the story, he started off toughly enough. Billy insisted that, after all that had happened, he be given command prerogatives as the senior flying officer in the service. Patrick was sympathetic, but adamantly insistent that if he was in command, he was damned well going to command.

Mitchell said that left him no choice but to resign from the Army. Patrick answered by escorting him directly to the office of General Harbord, the Deputy Chief of Staff, who had turned down Billy's resignation a few days before, but who now stated that if it were submitted again it would be accepted immediately. Harbord hadn't been in on Saturday when they first called, and Billy had the week end to think it over. For once in his life, he backed down and agreed to Patrick's terms.

The affair of the *Ostfriesland* and its aftermath was invariably written up as a turning point in air power, which, of course, it was. Along with the technical demonstration there was hard prophecy in Billy's verbal bombardment of the Pershing report as well. If he could attack the signature of the Chief of Staff of the United States Army so bluntly, and a Chief of Staff who was General Pershing at that, it was plain it was going to take a lot to stop Billy Mitchell.

* * * * *

I managed to get back east during 1923, and have a chat with Billy Mitchell in Washington. He was down in the dumps. Despite all his fighting, writing, flying, and daring speeches, he said, "Air power doesn't seem to be getting anywhere at all." The public was interested, but the individual leaders in Washington who could do something about it were not. It was true, there were a few new airplane types coming out, but nothing to speak of—not what he wanted. And there was that constant fight for funds. He was always defending himself against the Navy, the War Department, or some "idiotic" committee with an axe to grind about the accident rate or something like that, but so far as funds were concerned the Air Service had to work through the War Department budget, then through the Federal budget, and then the House would trim it even if the Senate did eventually give us a little back. All in all, it was a very thankless job.

That didn't mean Billy had quit fighting. Far from it. He was simply more zealous than before. Also, since

I had seen him last, he had made himself a new and rather potent adversary. Calvin Coolidge, who had succeeded the late President Harding in the White House, was not particularly enthusiastic about the flying machine, and he certainly didn't relish Billy Mitchell's unorthodox methods of promoting it. Indeed, President Coolidge's whole view of life was almost exactly opposite to that of the flying men, and there can have been few of his fellow citizens who aroused a testier feeling in him than Billy seemed to do personally.

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In the fall of 1924, shortly after the round-the-world flight of the Douglas Cruisers started, orders came transferring me to Washington to attend the Army Industrial College.

This was an interesting assignment. It seemed to me that in its planning the War Department was making a grave mistake in relying upon the automobile industry as the prime contractors for manufacturing airplanes. Nothing in my World War I experience had served to convince me that any automobile manufacturer could take the plans for an airplane from an aircraft manufacturer and, without knowing anything about the techniques or employment of aircraft metals or the small tolerances and other difficulties, build airplanes in quantity without unnecessary loss of time or long periods of schooling for metalmen. We discussed these things at great length during my course at the Industrial College, and finally agreed that the best idea would be to have the aircraft manufacturers as the main contractors—perhaps even depending on them for the jigs, dies, fittings, and special fixtures—and let them go to the automobile industry, or any other industry for small parts, subassemblies, and so on, even subletting contracts where necessary. This experience in planning was to stand me in good stead in later years.

Upon completion of my tour at the Industrial College, I was made Chief of the Information Section under General Patrick. I held that job during the last year of Billy Mitchell's service in Washington, and for a period just beyond the termination of his court-martial.

That circus whip of Billy's was now cracking in a manner which many quarters in Washington noticed. I saw that half the time it wasn't what Billy said, but the way he said it that made him enemies. Even General Patrick, though scarcely the most sweet-tempered of commanders (he certainly never seemed to forget that I had accepted his invitation to criticize his air command in France), frequently stuck his neck out to back Billy up.

Billy and I used to talk over the developments in flying and the men who were responsible for them. We both agreed there was one outstanding young man who would make a name for himself and be present in a big way when Air Power really came into being. His name was Doolittle.

Jimmy seems never to have been absent when something big was happening in Air Power. His dissenting opinion as a member of the Baker

(continued on page 189)

Airpower Vignette

America will remain indebted to Professor Langley for his experimental work on aircraft and for his guidance in building the great aeronautical tradition at the Smithsonian

Daedalus and Icarus were sons of a prophet.

Probably no concept has ever intrigued the mind more than the building of a contrivance that would give man the apparent freedom of a soaring bird. The exploits and doom of the waxen wings of the ancient Greek gods presaged a search through the ages for a more substantial device.

The genius of da Vinci found expression in the design of a propelled aircraft. Limited as he was by an inadequate technology, his aeronautical endeavors were soon relegated to the realm of curios.

Countless minds yearned to conquer the air. Countless abortive attempts manifested themselves in a strange conglomeration of kites, balloons, and nondescript air foils. Not all efforts were hit or miss, however. By the close of the nineteenth century scientific break-throughs attained prominence. Alexander Graham Bell was interested in the field of aeronautics. Undoubtedly, the most illustrious scientist to contribute significantly to the conquest of the air was an American, Professor S. P. Langley.

Langley's contribution culminated in what he called his Aerodrome. It possessed the essential requirements of a true flying machine. With little more technology than da Vinci had to support him, he succeeded in building and launching a flying model. Ill fortune harassed his efforts, however, and history was to accord to the Wright Brothers the honor of "architects of the air age." A Congress that had meagerly supported Langley soon became impatient with his lack of success. Professor Langley, oppressed by wide criticism, returned to his work at the Smithsonian Institution a disparaged man.

The Aerodrome, as an aircraft, presented to the world an intriguing device. It proved that a machine could fly. Years later it was flown successfully, but it possessed inherent aerodynamic deficiencies. The deficiency should become readily apparent to the present-day sophisticated reader. Can you determine the basic error in his air foil design?

In response to his total effort, America remains indebted to Professor Langley as the builder of the great tradition in Aeronautics at the Smithsonian. His abiding faith in the eventual success of a flying craft was instrumental in creating for this country a monument worthy of our lasting recognition and thanks.

We reproduce for you on the following pages Professor Langley's original account of aircraft development as of the year 1897.

PROFESSOR LANGLEY'S AËRODROME IN FLIGHT: A VIEW FROM ABOVE

McClure's Magazine.

Vol. IX. JUNE, 1897. No. 2.

THE "FLYING-MACHINE."

By Professor S. P. Langley.

With illustrations made directly from Professor Langley's machine and approved by him.

I HAVE been asked to prepare an account of some experiments I have conducted with flying-machines, built chiefly of steel, driven by steam-engines, and which have actually flown for considerable distances. There is in preparation a description of this work for the professional reader; but in view of the great general interest in it, and of the numerous unauthorized statements about it, it has seemed well to write provisionally the informal and popular account which is now given. The work has occupied so much of my life that I have presented what I have to say at present in narrative form.

PROFESSOR S. P. LANGLEY.
From the painting by Robert Gordon Hardie, 1893.

By "flying-machine" is here meant something much heavier than the air, and entirely different in principle from the balloon, which floats only on account of its lightness, as a ship in water. Nature has made her flying-machine in the bird, which is nearly a thousand times as heavy as the air its bulk displaces, and only those who have tried to rival it know how inimitable her work is, for the "way of a bird in the air" remains as wonderful to us as it was to Solomon, and the sight of the bird has constantly held this wonder before men's eyes and in some men's minds, and kept the flame of hope from utter extinction, in spite of long disappointment. I well remember how, as a child, when lying in a New England pasture, I watched a hawk soaring far up in the blue, and sailing for a long time without any motion of its

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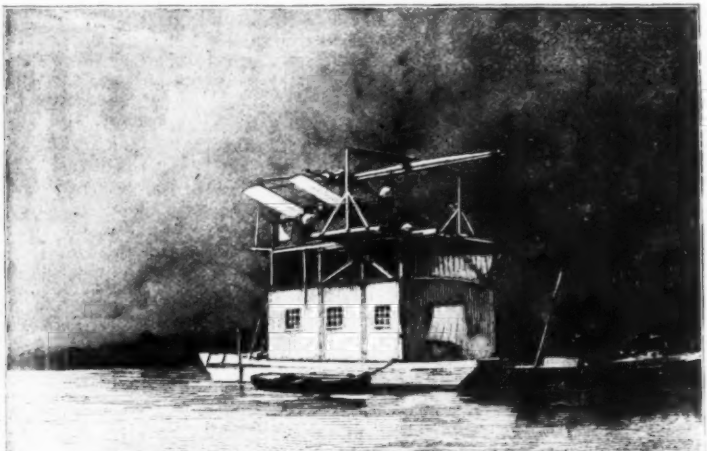
wings, as though it needed no work to sustain it, but was kept up there by some miracle. But, however sustained, I saw it sweep, in a few seconds of its leisurely flight, over a distance that to me was encumbered with every sort of obstacle, which did not exist for it. The wall over which I had climbed when I left the road, the ravine I had crossed, the patch of undergrowth through which I had pushed my way—all these were nothing to the bird, and while the road had only taken me in one direction, the bird's level highway led everywhere, and opened the way into every nook and corner of the landscape. How wonderfully easy, too, was its flight! There was not a flutter of its pinions as it swept over the field, in a motion which seemed as effortless as that of its shadow.

After many years and in mature life, I was brought to think of these things again, and to ask myself whether the problem of artificial flight was as hopeless and as absurd as it was then thought to be. Nature had solved it, and why not man? Perhaps it was because he had begun at the wrong end, and attempted to construct machines to fly before knowing the principles on which flight rested. I turned for these principles to my books, and got no help. Sir Isaac Newton had indicated a rule for finding the resistance to advance through the air, which seemed, if correct, to call for enormous mechanical power, and a distinguished French mathematician had given a formula showing how rapidly the power must increase with the velocity of flight, and according to which a swallow, to attain a speed it is now known to reach, must be possessed of the strength of a man.

Remembering the effortless flight of the soaring bird, it seemed that the first thing to do was to discard rules which led to such results, and to commence new experiments, not to build a flying-machine at once, but to find the principles upon which one should be built; to find, for instance, with certainty by direct trial how much horse-power was needed to sustain a surface of given weight by means of its motion through the air.

Having decided to look for myself at these questions, and at first hand, the apparatus for this preliminary investigation was installed at Allegheny, Pennsylvania, about ten years ago. It consisted of a "whirling table" of unprecedented size, mounted in the open air, and driven round by a steam-engine, so that the end of its revolving arm swept through a circumfer-



PREPARING TO LAUNCH THE AËRODROME. SEE PAGE 656.

From a photograph by A. Graham Bell, Esq.

ence of two hundred feet, at all speeds up to seventy miles an hour. At the end of this arm was placed the apparatus to be tested, and, among other things, this included surfaces disposed like wings, which were hung from the end of the arm and dragged through the air, till its resistance supported them as a kite is supported by the wind. One of the first things observed was that if it took a certain strain to sustain a properly disposed weight while it was stationary in the air, then not only to suspend it but to advance it rapidly at the same time, took less strain than in the first case. A plate of brass weighing one pound, for instance, was hung from the end of the arm by a spring, which was drawn out till it registered that pound weight when the arm was still. When the arm was in motion, with the spring pulling the plate after it, it might naturally be supposed that, as it was drawn faster, the pull would be greater, but the contrary was observed, for under these circumstances the spring *contracted*, till it registered less than an ounce. When the speed increased to that of a bird, the brass plate seemed to float on the air; and not only this, but taking into consideration both the strain and the velocity, it was found that absolutely less power was spent to make the plate move fast than slow, a result which seemed very extraordinary, since in all methods of land and water transport a high speed costs much more power than a slow one for the same distance.

THE AËRODROME IN FLIGHT, MAY 6, 1896. TWO VIEWS FROM INSTANTANEOUS PHOTOGRAPHS TAKEN BY A. GRAHAM BELL, ESQ. SEE PAGE 659.

These experiments were continued for three years, with the general conclusion that by simply moving any given weight of this form fast enough in a horizontal path it was possible to sustain it with less than one-twentieth of the power that Newton's rule called for. In particular it was proved that if we could insure horizontal flight without friction, about two hundred pounds of such plates could be moved through the air at the speed of an express train and sustained upon it, with the expenditure of one horse-power—sustained, that is, without any gas to lighten the weight, or by other means of flotation than the air over which it is made to run, as a swift skater runs safely over thin ice, or a skipping stone goes over water without sinking, till its speed is exhausted. This was saying that, so far as power alone

was concerned, mechanical flight was theoretically possible with engines we could then build, since I was satisfied that boilers and engines could be constructed to weigh less than twenty pounds to the horse-power, and that one horse-power would, in theory at least, support nearly ten times that if the flight were *horizontal*. Almost everything, it will be noticed, depends on this, for if the flight is downward it will end at the ground, and if upward the machine will be climbing an invisible hill, with the same or a greater effort than every bicycler experiences with a real one. Speed, then, and this speed expended in a horizontal course, were the first two requisites. This was not saying that a flying-machine could be started from the ground, guided into such flight in any direction, and brought back to earth in safety. There was, then, something more than power needed—that is, skill to use it, and the reader should notice the distinction. Hitherto it had always been supposed that it was wholly the lack of mechanical power to fly which made mechanical flight impossible. The first stage of the investigation had shown how much, or rather how little, power was needed in theory for the horizontal flight of a given weight, and the second stage, which was now to be entered upon, was to show first how to procure this power with as little weight as possible, and, having it, how by its means to acquire this horizontal flight in practice —that is, how to acquire the *art* of flight or how to build a ship that could actually navigate the air.

One thing which was made clear by these preliminary experiments, and made clear nearly for the first time, was that if a surface be made to advance rapidly, we secure an essential advantage in our ability to support it. Clearly we want the advance to get from place to place; but it proves also to be the only practicable way of supporting the thing at all, to thus take advantage of the inertia of the air, and this point is so all-important that we will renew an old illustration of it. The idea in a vague sense is as ancient as classical times. Pope says:

> "Swift Camilla scours the plain,
> Flies o'er the unbending corn, and skims along the main."

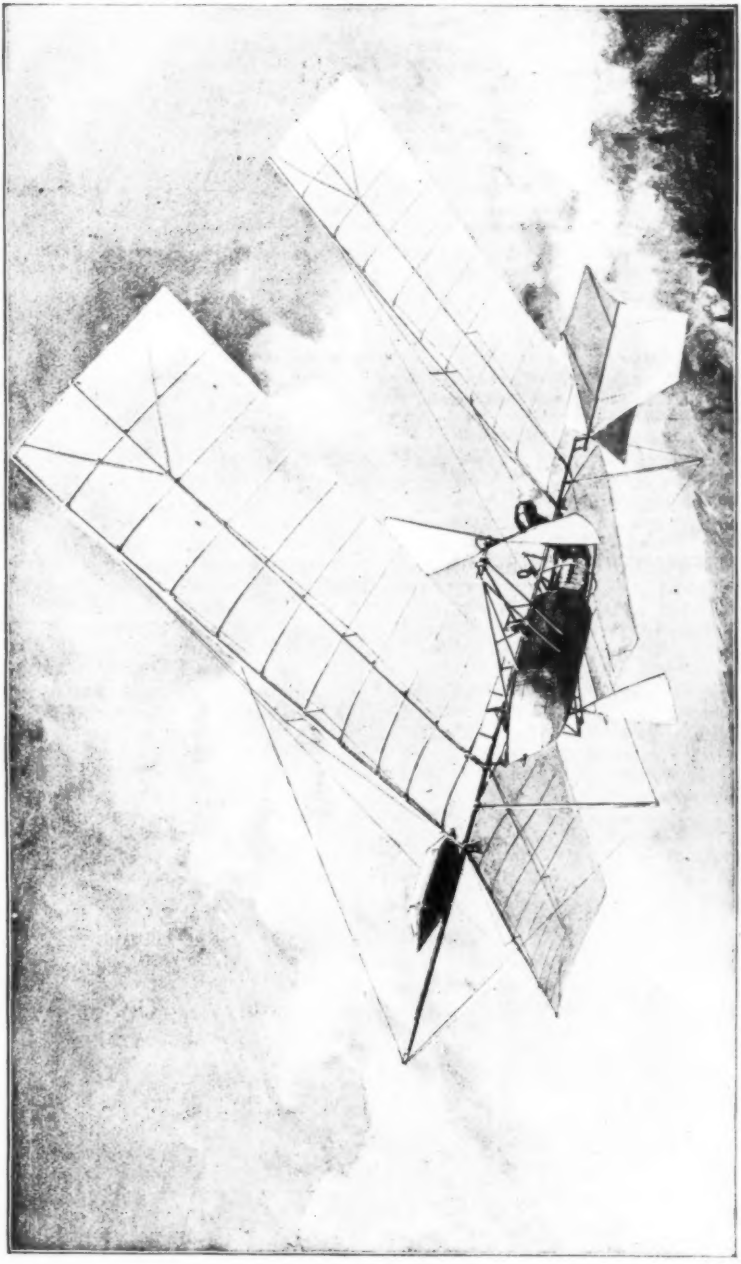
Now, is this really so in the sense that a Camilla, by running fast enough, could run over the tops of the corn? *If* she ran fast enough, yes; but the idea may be shown better by the analogous case of a skater who can glide safely over the thinnest ice if the speed is sufficient.

Think of a cake of ice of any small size, suppose a foot square. It possesses (like everything else in nature) inertia or resistance to displacement, and this will be less or more according to the mass moved. If the skater stands during a single second upon this small mass it will sink under him until he is perhaps waist-deep in the water, while a cake of the same width but twice the length will yield only about half as readily to his weight. On this he will sink only to his knees, we may suppose, while if we think of another cake ten times as long as the first—that is, one foot wide and ten feet long—we see that on this, during the same second, he will not sink above his feet. This is all plain enough; but now suppose the long cake to be divided into ten distinct portions, then it ought to be equally clear that the skater who glides over the whole in a second, distributes his weight over just as much ice as though all ten were in one solid piece. So it is with the air. Even the viewless air possesses inertia; it cannot be pushed aside without some effort; and while the portion which is directly under the airship would not keep it from falling several yards in the first second, if the ship goes forward so that it runs or treads on thousands of such portions in that time, it will sink in proportionately less degree; sink, perhaps, only through a fraction of an inch.

Speed, then, is indispensable here. A balloon, like a ship, will float over one spot in safety, but our flying-machine must be in motion to sustain itself, and in motion, in fact, before it can even begin to fly.

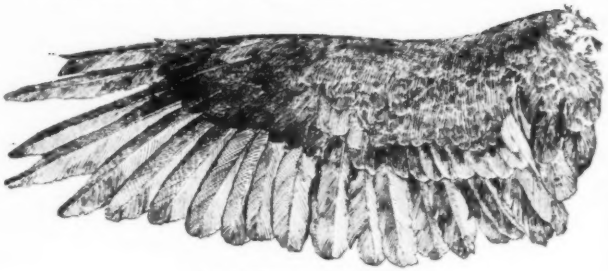
Perhaps we may more fully understand what is meant by looking at a boy's kite. Every one knows that it is held by a string against the wind which sustains it, and that it falls in a calm. Most of us remember that even in a calm, if we run and draw it along, it will still keep up, for what is required is motion relative to the air, however obtained.

It can be obtained without the cord if the same pull is given by an engine and propellers strong enough to draw it, and light enough to be attached to and sustained by it. The stronger the pull and the quicker the motion, the heavier the kite may be made. It may be, instead of a sheet of paper, a sheet of metal even, like the plate of brass which has already been mentioned as seeming, when in rapid motion, to float upon the air, and, if it will



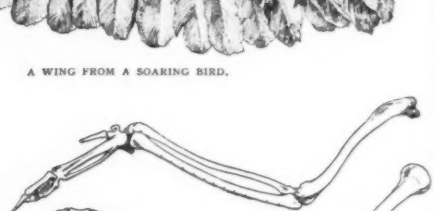
THE AËRODROME IN FLIGHT: A VIEW FROM BELOW.

make the principle involved more clear, the reader may think of our aërodrome as a great steel kite made to run fast enough over the air to sustain itself, whether in a calm or in a wind, by means of its propelling machinery, which takes the place of the string.

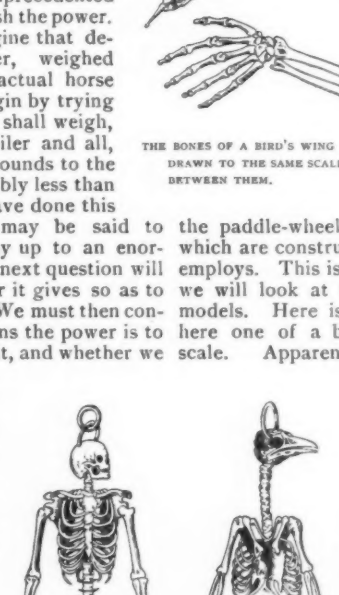


A WING FROM A SOARING BIRD.

And now having the theory of the flight before us, let us come to the practice. The first thing will be to provide an engine of unprecedented lightness, that is to furnish the power. A few years ago an engine that developed a horse-power, weighed nearly as much as the actual horse did. We have got to begin by trying to make an engine which shall weigh, everything complete, boiler and all, not more than twenty pounds to the horse-power, and preferably less than ten; but even if we have done this very hard thing, we may be said to have only fought our way up to an enormous difficulty, for the next question will be how to use the power it gives so as to get a horizontal flight. We must then consider through what means the power is to be applied when we get it, and whether we shall, for instance, have wings or screws. At first it seems as though Nature must know best, and that since her flying models, birds, are exclusively employing wings, this is the thing for us; but perhaps this is not the case. If we had imitated the horse or the ox, and made the machine which draws our trains walk on legs, we should undoubtedly never have done as well as with the locomotive rolling on wheels; or if we had imitated the whale with its fins, we should not have had so good a boat as we now have in the steamship with the paddle-wheels or the screw, both of which are constructions that Nature never employs. This is so important a point that we will look at the way Nature got her models. Here is a human skeleton, and here one of a bird, drawn to the same scale. Apparently Nature made one out of the other, or both out of some common type, and the closer we look, the more curious the likeness appears.



THE BONES OF A BIRD'S WING AND THE BONES OF A HUMAN ARM, DRAWN TO THE SAME SCALE, SHOWING THE CLOSE RESEMBLANCE BETWEEN THEM.



THE SKELETON OF A MAN AND THE SKELETON OF A BIRD, DRAWN TO THE SAME SCALE, SHOWING THE CURIOUS LIKENESS BETWEEN THEM.

Here is a wing from a soaring bird, here the same wing stripped of its feathers, and here the bones of a human arm, on the same scale. Now, on comparing them we see still more clearly than in the skeleton, that the bird's wing has developed out of something like our own arm. First comes the humerus, or principal bone of the upper arm, which is in the wing also. Next we see that the forearm of the bird

repeats the radius and ulna, or two bones of our own forearm, while our wrist and finger-bones are modified in the bird to carry the feathers, but are still there. To make the bird, then, Nature appears to have taken what material she had in stock, so to speak, and developed it into something that would do. It was all that Nature had to work on, and she has done wonderfully well with such unpromising material; but any one can see that our arms would not be the best thing to make flying-machines out of, and that there is no need of our starting there when we can start with something better and develop that. Flapping wings might be made on other principles, and perhaps will be found in future flying-machines, but the most promising thing to try seemed to me to be the screw propeller.

Some twenty years ago, Penaud, a Frenchman, made a toy, consisting of a flat, immovable sustaining wing surface, a flat tail, and a small propelling screw. He made the wing and tail out of paper or silk, and the propeller out of cork and feathers, and it was driven directly by strands of india-rubber twisted lamplighter fashion, and which turned the wheel as they untwisted.

PENAUD'S FLYING TOY (ONE-EIGHTH OF ACTUAL SIZE).

The great difficulty of the task of creating a flying-machine may be partly understood when it is stated that no machine in the whole history of invention, unless it were this toy of Penaud's, had ever, so far as I can learn, flown for even ten seconds; but something that will actually fly must be had to teach the art of "balancing."

When experiments are made with models moving on a whirling table or running on a railroad track, these are *forced* to move horizontally and at the same time are held so that they cannot turn over; but in free flight there will be nothing to secure this, unless the airship is so adjusted in all its parts that it tends to move steadily and horizontally, and the acquisition of this adjustment or art of "balancing" in the air is an enormously difficult thing, and which, it will be seen later, took years to acquire.

My first experiments in it, then, were with models like these, but from them I got only a rude idea how to balance the future aërodrome, partly on account of the brevity of their flight, which only lasted a few seconds, partly on account of its irregularity. Although, then, much time and labor were spent by me on these, it was not possible to learn much about the balancing from them.

Thus it appeared that something which could give longer and steadier flights than india-rubber must be used as a motor, even for the preliminary trials, and calculations and experiments were made upon the use of compressed air, carbonic acid gas, electricity in primary and storage batteries, and numerous other contrivances, but all in vain. The gas-engine promised to be best ultimately, but nothing save steam gave any promise of immediate success in supporting a machine which would teach these conditions of flight by actual trial, for all were too heavy, weight being the great enemy. It was true also that the steam-driven model could not be properly constructed until the principal conditions of flight were learned, nor these be learned till the working model was experimented with, so that it seemed that the inventor was shut up in a sort of vicious circle.

However, it was necessary to begin in some way, or give up at the outset, and the construction began with a machine to be driven by a steam-engine, through the means of propeller wheels, somewhat like the twin screws of a modern steamship, but placed amidships, not at the stern. There were to be rigid and motionless wings, slightly inclined, like the surface of a kite, and a construction was made on this plan which gave, if much disappointment, a good deal of useful experience. It was intended to make a machine that would weigh twenty or twenty-five pounds, constructed of steel tubes. The engines were made with the best advice to be got (I am not an engineer); but while the boiler was a good deal too heavy, it was still too small to get up steam for the engines, which weighed about four pounds, and could have developed a horse-power if there were steam enough. This machine, which was to be moved by two propelling screws, was labored on for many months, with the result that the weight was constantly increasing beyond the estimate until, before it was done, the whole weighed over forty pounds, and yet could only get steam for about a half horse-power, which, after deductions for loss in transmission, would give not more than half that gain in actual thrust. It was clear that whatever pains it had cost, it must be abandoned.

This aërodrome* could not then have flown; but having learned from it the formidable difficulty of making such a thing light enough, another was constructed, which was made in the other extreme, with two engines to be driven by compressed air, the whole weighing but five or six pounds. The power proved insufficient. Then came another, with engines to use carbonic-acid gas, which failed from a similar cause. Then followed a small one to be run by steam, which gave some promise of success, but when tried indoors it was found to lift only about one-sixth of its own weight. In each of these the construction of the whole was remodeled to get the greatest strength and lightness combined, but though each was an improvement on its predecessor, it seemed to become more and more doubtful whether it could ever be made sufficiently light, and whether the desired end could be reached at all.

The chief obstacle proved to be not with the engines, which were made surprisingly light after sufficient experiment. The great difficulty was to make a boiler of almost no weight which would give steam enough, and this was a most wearying one. There must be also a certain amount of wing surface, and large wings weighed prohibitively; there must be a frame to hold all together, and the frame, if made strong enough, must yet weigh so little that it seemed impossible to make it. These were the difficulties that I still found myself in after two years of experiment, and it seemed at this stage again as if it must, after all, be given up as a hopeless task, for somehow the thing had to be built stronger and lighter yet. Now, in all ordinary construction, as in building a steamboat or a house, engineers have what they call a factor of safety. An iron column, for instance, will be made strong enough to hold five or ten times the weight that is ever going to be put upon it, but if we try anything of the kind here the construction will be too heavy to fly. Everything in the work has got to be so light as to be on the edge of breaking down and disaster, and when the breakdown comes all we can do is to find what is the weakest part and make that part stronger; and in this way work went on, week by week and month by month, constantly altering the form of construction so as to strengthen the weakest parts, until, to abridge a story which extended over years, it was finally brought nearly to the shape it is now, where the completed mechanism, furnishing over a horse-power, weighs collectively something less than seven pounds. This does not include water, the amount of which depends on how long we are to run; but the whole thing, as now constructed, boiler, fire-grate, and all that is required to turn out an actual horse-power and more, weighs something less than one one-hundredth part of what the horse himself does. I am here anticipating; but after these first three years something not greatly inferior to this was already reached, and so long ago as that, there had accordingly been secured mechanical power to fly, if that were all—but it is not all.

After that came years more of delay arising from other causes, and I can hardly repeat the long story of subsequent disappointment, which commenced with the first attempts at actual flight.

Mechanical power to fly was, as I say, obtained three years ago; the machine could lift itself if it ran along a railroad track, and it might seem as though, when it could lift itself, the problem was solved. I knew that it was far from solved, but felt that the point was reached where an attempt at actual free flight should be made, though the anticipated difficulties of this were of quite another order to those experienced in shop construction. It is enough to look up at the gulls or buzzards, soaring overhead, and to watch the incessant rocking and balancing which accompanies their gliding motion to apprehend that they find something more than mere strength of wing necessary, and that the machine would have need of something more than mechanical power, though what this something was, was not clear. It looked as though it might need a power like instinctive adaptation to the varying needs of each moment, something that even an intelligent steersman on board could hardly supply, but to find what this was a trial had to be made. The first difficulty seemed to be to make the initial flight in such conditions that the machine would not wreck itself at the outset, in its descent, and the first question was where to attempt to make the flight.

It became clear without much thought that since the machine was at first unprovided with any means to save it from breakage on striking against the ground, it would be well, in the initial stage of the experiment, not to have it light on the ground at all, but on the water. As it was probable that, while skill in launching was being gained, and until after practice had made

* Aërodrome, from words signifying air-runner, the running over the air being the essence of its plan.

perfect, failures would occur, and as it was not desired to make any public exhibition of these, a great many places were examined along the shores of the Potomac, and on its high bluffs, which were condemned partly for their publicity, but partly for another reason. In the course of my experiments I had found out, among the infinite things pertaining to this problem, that the machine must begin to fly in the face of the wind, and just in the opposite way to a ship, which begins its voyage with the wind behind it. If the reader has ever noticed a soaring bird get upon the wing, he will see that it does so with the breeze against it, and thus whenever the aërodrome is cast into the air, it must face a wind which may happen to blow from the north, south, east, or west, and we had better not make the launching station a place like the bank of a river, where it can go only one way. It was necessary, then, to send it from something which could be turned in any direction, and taking this need in connection with the desirability that at first the airship should light in the water, there came at last the idea (which seems obvious enough when it is stated) of getting some kind of a barge or boat, and building a small structure upon it, which could house the aërodrome when not in use, and from whose flat roof it could be launched in any direction. Means for this were limited, but a little "scow" was procured, and on it was built a primitive sort of a house, one story high, and on the house a platform about ten feet higher, so that the top of the platform was about twenty feet from the water, and this was to be the place of the launch. This boat it was found necessary to take down the river as much as thirty miles from Washington, where I then was,—since no suitable place could be found nearer,—to an island having a stretch of quiet water between it and the main shore; and here the first experiments in attempted flight developed difficulties of a new kind, difficulties which were partly anticipated, but which nobody would probably have conjectured would be of their actually formidable character, which was such as for a long time to prevent any trial being made at all. They arose partly out of the fact that even such a flying-machine as a soaring bird has to get up an artificial speed before it is on the wing. Some soaring birds do this by an initial run upon the ground, and even under the most urgent pressure cannot fly without it.

Take the following graphic description of the commencement of an eagle's flight (the writer was in Egypt, and the "sandy soil" was that of the banks of the Nile):

"An approach to within eighty yards aroused the king of birds from his apathy. He partly opened his enormous wings, but stirs not yet from his station. On gaining a few feet more he begins to *walk* away, with half-expanded but motionless wings. Now for the chance, fire! A charge of number three from eleven bore rattles audibly but ineffectively upon his densely feathered body; his walk increases to a run, he gathers speed with his slowly waving wings, and eventually leaves the ground. Rising at a gradual inclination, he mounts aloft and sails majestically away to his place of refuge in the Libyan range, distant at least five miles from where he rose. Some fragments of feathers denoted the spot where the shot had struck him. The marks of his claws were traceable in the sandy soil, as, at first with firm and decided digs, he forced his way, but as he lightened his body and increased his speed with the aid of his wings, the imprints of his talons gradually merged into long scratches. The measured distance from the point where these vanished, to the place where he had stood, proved that with all the stimulus that the shot must have given to his exertions, he had been compelled to run full twenty yards before he could raise himself from the earth."

We have not all had a chance to see this striking illustration of the necessity of getting up a preliminary speed before soaring, but many of us have disturbed wild ducks on the water and noticed them run along it, flapping their wings for some distance to get velocity before they can fly, and the necessity of the initial velocity is at least as great with our flying-machine as it is with a bird.

To get up this preliminary speed, many plans were proposed, one of which was to put the aërodrome on the deck of a steamboat and go faster and faster until the head wind lifted it off the deck. This sounds reasonable, but is absolutely impracticable, for when the aërodrome is set up anywhere in the open air we find that the very slightest wind will turn it over, unless it is firmly held. The whole must be in motion, but in motion from something to which it is held till that critical instant when it is set free as it springs into the air.

The house-boat was fitted with an apparatus for launching the aërodrome with

a certain initial velocity, and was (in 1893) taken down the river and moored in the stretch of quiet water I have mentioned, the general features of the place being indicated on the accompanying map; and it was here that the first trials at launching were made, under the difficulties to which I have alluded.

Perhaps the reader will take patience to hear an abstract of a part of the diary of these trials, which commenced with a small aërodrome which had finally been built to weigh only about ten pounds, which had an engine of not quite one-half horse-power, and which could lift much more than was theoretically necessary to enable it to fly. The exact construction of this early aërodrome is unimportant, as it was replaced later by an improved one, of which a drawing is given on page 658, but it was the first outcome of the series of experiments which had occupied three years, though the disposition of its supporting surfaces, which should cause it to be properly balanced in the air and neither fly up nor down, had yet to be ascertained by trial.

What must still precede this trial was the provision of the apparatus for launching it into the air. It is a difficult thing to launch a ship, although gravity keeps it down upon the ways, but the problem here is that of launching a kind of ship which is as ready to go up into the air like a balloon as to go off sideways, and readier to do either than to go straight forward, as it is wanted to do, for though there is no gas in the flying-machine, its great extent of wing surface renders it something like an albatross on a ship's deck—the most unmanageable and helpless of creatures until it is in its proper element.

If there were an absolute calm, which never really happens, it would still be impracticable to launch it as a ship is launched, because the wind made by running it along would get under the wings and turn it over. But there is always more or less wind, and even the gentlest breeze was afterward found to make the airship unmanageable unless it was absolutely clamped down to whatever served to launch it, and when it was thus firmly clamped, as it must be at several distinct points, it was necessary that it should be released simultaneously at all these at the one critical instant that it was leaping into the air. This is another difficult condition, but that it is an indispensable one may be inferred from what has been said. In the first form of launching-piece this initial velocity was sought to be attained by a spring, which threw forward the supporting frame on which the aërodrome rested, but at this time the extreme susceptibility of the whole construction to injury from the wind, and the need of protecting it from even the gentlest breeze, had not been appreciated by experience. On November 18, 1893, the aërodrome had been taken down the river, and the whole day was spent in waiting for a calm, as the machine could not be held in position for launching for two seconds in the lightest breeze. The party returned to Washington and came down again on the 20th, and although it seemed that there was scarcely any movement in the air, what little remained was enough to make it impossible to maintain the aërodrome in position. It was let go, notwithstanding, and a portion struck against the edge of the launching-piece, and all fell into the water before it had an opportunity to fly.

On the 24th, another trip was made, and another day spent ineffectively on account of the wind. On the 27th there was a similar experience, and here four days and four (round-trip) journeys of sixty miles each had been spent without a single result. This may seem to be a trial of patience, but it was repeated in December, when five fruitless trips were made, and thus nine such trips were made in these two months, and but once was the aërodrome even attempted to be launched, and this attempt was attended with disaster. The principal cause lay, as I have said, in the unrecognized amount of difficulty introduced even by the very smallest wind, as a breeze of three or four miles an hour, hardly perceptible to the face, was enough to keep the airship from resting in place for the critical seconds preceding the launching.

If we remember that this is all irrespective of the fitness of the launching-piece itself, which at first did not get even a chance for trial, some of the difficulties may be better understood, and there were many others.

During most of the year of 1894 there was the same record of defeat. Five more trial trips were made in the spring and summer, during which various forms of launching apparatus were tried with varied forms of disaster. Then it was sought to hold the aërodrome out over the water and let it drop from the greatest attainable height, with the hope that it might acquire the requisite speed of advance before the water was reached. It will hardly be as-

ticipated that it was found impracticable at first to simply let it drop, without something going wrong, but so it was, and it soon became evident that even were this not the case, a far greater time of fall was requisite for this method than that at command. The result was that in all these eleven months the aërodrome had not been launched, owing to difficulties which seem so slight that one who has not experienced them may wonder at the trouble they caused.

Finally, in October, 1894, an entirely new launching apparatus was completed, which embodied the dozen or more requisites, the need for which had been independently proved in this long process of trial and error. Among these was the primary one that it was capable of sending the aërodrome off at the requisite initial speed, in the face of a wind from whichever quarter it blew, and it had many more facilities which practice had proved indispensable.

This new launching-piece did its work in this respect effectively, and subsequent disaster was, at any rate, not due to it. But now a new series of failures took place, which could not be attributed to any defect of the launching apparatus, but to a cause which was at first obscure, for sometimes the aërodrome, when successfully launched, would dash down forward and into the water, and sometimes (under apparently identically like conditions) would sweep almost vertically upward in the air and fall back, thus behaving in entirely opposite ways, although the circumstances of flight seemed to be the same. The cause of this class of failure was finally found in the fact that as soon as the whole was upborne by the air, the wings yielded under the pressure which supported them, and were momentarily distorted from the form designed and which they appeared to possess. "Momentarily," but enough to cause the wind to catch the top, directing the flight downward, or under them, directing it upward, and to wreck the experiment. When the cause of the difficulty was found, the cure was not easy, for it was necessary to make these great sustaining surfaces rigid so that they could not bend, and to do this without making them heavy, since weight was still the enemy; and nearly a year passed in these experiments.

Has the reader enough of this tale of disaster? If so, he may be spared the account of what went on in the same way. Launch after launch was successively made. The wings were finally, and after infinite patience and labor, made at once light enough and strong enough to do the work, and now in the long struggle the way had been fought up to the face of the final difficulty, in which nearly a year more passed, for the all-important difficulty of balancing the aërodrome was now reached, where it could be discriminated from other preliminary ones, which have been alluded to, and which at first obscured it. If the reader will look at the hawk or any soaring bird, he will see that as it sails through the air without flapping the wing, there are hardly two consecutive seconds of its flight in which it is not swaying a little from side to side, lifting one wing or the other, or turning in a way that suggests an acrobat on a tight-rope, only that the bird uses its widely outstretched wings in place of the pole.

There is something, then, which is difficult even for the bird, in this act of balancing. In fact, he is sailing so close to the wind in order to fly at all, that if he dips his head but the least he will catch the wind on the top of his wing and fall, as I have seen gulls do, when they have literally tumbled toward the water before they could recover themselves.

Beside this, there must be some provision for guarding against the incessant, irregular currents of the wind, for the wind as a whole—and this is a point of prime importance—is not a thing moving along all-of-a-piece, like water in the Gulf Stream. Far from it. The wind, when we come to study it, as we have to do here, is found to be made of innumerable currents and counter-currents which exist altogether and simultaneously in the gentlest breeze, which is in reality going fifty ways at once, although, as a whole, it may come from the east or the west; and if we could see it, it would be something like seeing the rapids below Niagara, where there is an infinite variety of motion in the parts, although there is a common movement of the stream as a whole.

All this has to be provided for in our mechanical bird, which has neither intelligence nor instinct, without which, although there be all the power of the engines requisite, all the rigidity of wing, all the requisite initial velocity, it still cannot fly. This is what is meant by balancing, or the disposal of the parts, so that the airship will have a position of equilibrium into which it tends to fall when it is disturbed, and which will enable it to move of its own volition, as it were, in a horizontal course.

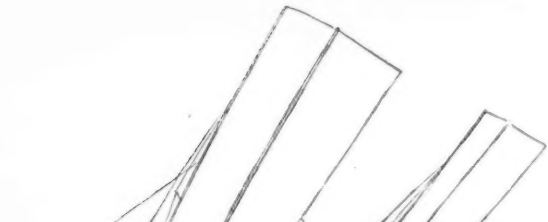


DIAGRAM OF THE AËRODROME AS DESCRIBED BELOW.

Now the reader may be prepared to look at the apparatus which finally has flown. (See diagram above.) In the completed form we see two pairs of wings, each slightly curved, each attached to a long steel rod which supports them both, and from which depends the body of the machine, in which are the boilers, the engines, the machinery, and the propeller wheels, these latter being not in the position of those of an ocean steamer, but more nearly amidships. They are made sometimes of wood, sometimes of steel and canvas, and are between three and four feet in diameter.

The hull itself is formed of steel tubing; the front portion is closed by a sheathing of metal which hides from view the fire-grate and apparatus for heating, but allows us to see a little of the coils of the boiler and all of the relatively large smoke-stack in which it ends. The conical vessel in front is an empty float, whose use is to keep the whole from sinking if it should fall in the water.

This boiler supplies steam for an engine of between one and one and one-half horse-power, and, with its fire-grate, weighs a little over five pounds. This weight is exclusive of that of the engine, which weighs, with all its moving parts, but twenty-six ounces. Its duty is to drive the propeller wheels, which it does at rates varying from 800 to 1,200, or even more, turns a minute, the highest number being reached when the whole is speeding freely ahead.

The rudder, it will be noticed, is of a shape very unlike that of a ship, for it is adapted both for vertical and horizontal steering. It is impossible within the limits of such an article as this, however, to give an intelligible account of the manner in which it performs its automatic function. Sufficient it is to say that it does perform it.

The width of the wings from tip to tip is between twelve and thirteen feet, and the length of the whole about sixteen feet. The weight is nearly thirty pounds, of which about one-fourth is contained in the machinery. The engine and boilers are constructed with an almost single eye to economy of weight, not of force, and are very wasteful of steam, of which they spend their own weight in five minutes. This steam might all be recondensed and the water re-used by proper condensing apparatus, but this cannot be easily introduced in so small a scale of construction. With it the time of flight might be hours instead of minutes, but without it the flight (of the present aërodrome) is limited to about five minutes, though in that time, as will be seen presently, it can go some miles; but owing to the danger of its leaving the surface of the water for that of the land, and wrecking itself on shore, the time of flight is limited designedly to less than two minutes.

I have spared the reader an account of numberless delays, from continuous accidents and from failures in attempted flights, which prevented a single entirely satisfactory one during nearly three years after a machine with power to fly had been attained. It is true that the aërodrome maintained itself in the air at many times, but some disaster had so often intervened to prevent a complete flight that the most persistent hope must at some time have yielded. On the 6th of May of last year I had journeyed, perhaps for the twentieth time, to the distant river station, and recommenced the weary routine of another launch, with very moderate expectation indeed; and when, on that, to me, memorable afternoon the signal was given and the aërodrome sprang into the air,* I

* The illustration on page 649, from an instantaneous photograph by Mr. Bell, shows the machine after Mr. Reed, who was in charge of the launch (and to whom a great deal of the construction of the aërodrome is due), has released it, and when it is in the first instant of its aërial journey.

watched it from the shore with hardly a hope that the long series of accidents had come to a close. And yet it had, and for the first time the aërodrome swept continuously through the air like a living thing, and as second after second passed on the face of the stop-watch, until a minute had gone by, and it still flew on, and as I heard the cheering of the few spectators, I felt that something had been accomplished at last, for never in any part of the world, or in any period, had any machine of man's construction sustained itself in the air before for even half of this brief time. Still the aërodrome went on in a rising course until, at the end of a minute and a half (for which time only it was provided with fuel and water), it had accomplished a little over half a mile, and now it settled rather than fell into the river with a gentle descent. It was immediately taken out and flown again with equal success, nor was there anything to indicate that it might not have flown indefinitely except for the limit put upon it.

I was accompanied by my friend, Mr. Alexander Graham Bell, who not only witnessed the flight, but took the instantaneous photograph of it which has been given. He spoke of it in a communication to the Institute of France in the following terms:

Through the courtesy of Mr. S. P. Langley, Secretary of the Smithsonian Institution, I have had on various occasions the privilege of witnessing his experiments with aërodromes, and especially the remarkable success attained by him in experiments made on the Potomac River on Wednesday, May 6, which led me to urge him to make public some of these results.

I had the pleasure of witnessing the successful flight of some of these aërodromes more than a year ago, but Professor Langley's reluctance to make the results public at that time prevented me from asking him, as I have done since, to let me give an account of what I saw.

On the date named, two ascensions were made by the aërodrome, or so-called "flying-machine," which I will not describe here further than to say that it appeared to me to be built almost entirely of metal, and driven by a steam-engine which I have understood was carrying fuel and a water-supply for a brief period, and which was of extraordinary lightness.

The absolute weight of the aërodrome, including that of the engine and all appurtenances, was, as I was told, about twenty-five pounds, and the distance, from tip to tip, of the supporting surfaces was, as I observed, about twelve or fourteen feet.

The method of propulsion was by aërial screw propellers, and there was no gas or other aid for lifting it in the air except its own internal energy.

On the occasion referred to, the aërodrome, at a given signal, started from a platform about twenty feet above the water, and rose at first directly in the face of the wind, moving at all times with remarkable steadiness, and subsequently swinging around in large curves of, perhaps, a hundred yards in diameter, and continually ascending until its steam was exhausted, when, at a lapse of about a minute and a half, and at a height which I judged to be between eighty and one hundred feet in the air, the wheels ceased turning, and the machine, deprived of the aid of its propellers, to my surprise did not fall, but settled down so softly and gently that it touched the water without the least shock, and was in fact immediately ready for another trial.

In the second trial, which followed directly, it repeated in nearly every respect the actions of the first, except that the direction of its course was different. It ascended again in the face of the wind, afterwards moving steadily and continually in large curves, accompanied with a rising motion and a lateral advance. Its motion was, in fact, so steady that I think a glass of water on its surface would have remained unspilled. When the steam gave out again, it repeated for a second time the experience of the first trial when the steam had ceased, and settled gently and easily down. What height it reached at this trial I cannot say, as I was not so favorably placed as in the first; but I had occasion to notice that this time its course took it over a wooded promontory, and I was relieved of some apprehension in seeing that it was already so high as to pass the tree-tops by twenty or thirty feet. It reached the water one minute and thirty-one seconds from the time it started, at a measured distance of over nine hundred feet from the point at which it rose.

This, however, was by no means the length of its flight. I estimated from the diameter of the curve described, from the number of turns of the propellers as given by the automatic counter, after due allowance for slip, and from other measures, that the actual length of flight on each occasion was slightly over three thousand feet. It is at least safe to say that each exceeded half an English mile.

From the time and distance it will be noticed that the velocity was between twenty and twenty-five miles an hour, in a course which was constantly taking it "up hill." I may add that on a previous occasion I have seen a far higher velocity attained by the same aërodrome when its course was horizontal.

I have no desire to enter into detail further than I have done, but I cannot but add that it seems to me that no one who was present on this interesting occasion could have failed to recognize that the practicability of mechanical flight had been demonstrated.

ALEXANDER GRAHAM BELL.

On November 28th I witnessed, with another aërodrome of somewhat similar construction, a rather longer flight, in which it traversed about three-quarters of a mile, and descended with equal safety. In this the speed was greater, or about thirty miles an hour. The course of this date is indicated by the dotted line in the diagram on page 660. We may live to see airships a common sight, but habit has not dulled the edge of wonder, and I wish that the reader could have witnessed the actual spectacle. "It looked like a miracle," said one who saw it, and the photograph, though taken from the original, conveys but imperfectly the impression given by the flight itself.

And now, it may be asked, what has been

done? This has been done: a "flying-machine," so long a type for ridicule, has really flown; it has demonstrated its practicability in the only satisfactory way—by actually flying, and by doing this again and again, under conditions which leave no doubt.

There is no room here to enter on the consideration of the construction of larger machines, or to offer the reasons for believing that they may be built to remain for days in the air, or to travel at speeds higher than any with which we are familiar; neither is there room to enter on a consideration of their commercial value, or of those applications which will probably first come in the arts of war rather than those of peace; but we may at least see that these may be such as to change the whole conditions of warfare, when each of two opposing hosts will have its every movement known to the other, when no lines of fortification will keep out the foe, and when the difficulties of defending a country against an attacking enemy in the air will be such that we may hope that this will hasten rather than retard the coming of the day when war shall cease.

I have thus far had only a purely scientific interest in the results of these labors. Perhaps if it could have been foreseen at the outset how much labor there was to be, how much of life would be given to it, and how much care, I might have hesitated to enter upon it at all. And now reward must be looked for, if reward there be, in the knowledge that I have done the best I could in a difficult task, with results which it may be hoped will be useful to others. I have brought to a close the portion of the work which seemed to be specially mine—the demonstration of the practicability of mechanical flight—and for the next stage, which is the commercial and practical development of the idea, it is probable that the world may look to others. The world, indeed, will be supine if it do not realize that a new possibility has come to it, and that the great universal highway overhead is now soon to be opened.

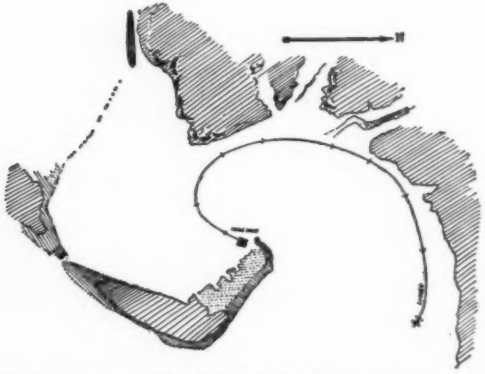


DIAGRAM SHOWING THE COURSE OF THE AËRODROME IN ITS FLIGHT ON THE POTOMAC RIVER AT QUANTICO. SEE PAGE 659.

EVERYBODY KNOWS HOW . . .

(continued from page 172)

Board, in 1934, in which he stressed the need for a unified service with an independent Air Force, is as historic as the story of his operational commands. It is interesting that Billy Mitchell, describing the night after the court-martial finally found him guilty, mentions only one name. "But the implications of my trial were overshadowed, in my mind anyhow, by one great event which no one seemed to associate with my predictions. It seemed to be lost in the sweep of happenings of the time. It had taken place as my court-martial approached its climax. Lieutenant James H. Doolittle, the champion aquatic aviator of the Army, had set his fourth world speed-record for seaplanes at Bay Shore Park by flying four times over a measured course at an average speed of 245.715 miles per hour.

"I was interested in Jimmy because, for one thing, he knew Alaska. Previously, that year, Jimmy, who was to become one of the most scientific flyers in the world, had won the Schneider Cup Race. With cold and deadly accuracy he had written in the sky the answer to my conviction!"

I said to Mitchell again and again: "Billy, take it easy. We need you. Don't throw everything away just to beat out some guy who doesn't understand! Air Power is coming! Calm down, Billy. Get a balance wheel in your office! Let him look over some of the things you write before you put them out! Stop saying all these things about the independent air arm

DISTINGUISHED VISITORS AT AIR RACES: 1922

Admiral Fullam and Gen. Mitchell seated beside Orville Wright. Both Fullam and Mitchell were among the first to sense the potential of airpower.

that are driving these old Army and Navy people crazy!"

But he would always reply: "When senior officers won't see the facts, something unorthodox, perhaps an explosion, is necessary. I'm doing it for the good of the Air Force, for the future Air Force, for the good of you fellows. I can afford to do it. You can't."

* * * * *

In February, 1925, General Patrick was reappointed Chief of the Air Service. General Mitchell, to the surprise of numerous editorial writers but not of everybody in Washington, was not redesignated as his assistant. Billy was ordered to Fort Sam Houston, Texas, as "Air Officer" where he reverted to his permanent rank of Colonel, being succeeded by Lieutenant Colonel (soon Brigadier General) James E. Fechet.

We naturally mourned Mitchell's departure though we scarcely re-

garded it as permanent. For the time being, no more warm gatherings at the house in Middleburg, no more of those flashing statements in the morning papers like the very ones he left us with: "Neither armies nor navies can exist unless the air is controlled over them. The evidence shows plainly that the United States has adopted no modern plan of organization for meeting the general world movement in the organization of world power . . . [and] . . . I found it impossible to do everything in the War and Navy Departments on the matter of air defense. So I took it to Congress and the people, and will continue to take it to them until it is recognized. . . . I have not even begun to fight!"

So Billy went off to Texas, where they still called him "General," and for a time there was relative silence, though occasional remarks still got into print from down there, and once he and his observer were nearly killed in a crash from which he walked away, saying casually: "It's all in the day's work."

From time to time he would write me sharp little notes, sometimes only a sentence or two long, referring to some incident that illustrated a previously expressed view of his. Once a note came which simply repeated that conspiratorial phrase he had used down on the Border: "Things are coming along well. Keep going as you are."

* * * * *

On September 1st and 3rd, two things happened in rapid succession. First, my old friend, Commander John Rodgers, and the crew of four with whom he was trying to fly from San Francisco to Honolulu, were reported missing in the Pacific. As the great and finally successful search for them by planes, ships, and submarines went on, publicity was given to the fact that their gas supply had not been sufficient if they should encounter headwinds—as they did on the second day. Mitchell went on the air in San Antonio and called them "martyrs." While they were still missing on the 3rd, the tragedy of the *Shenandoah* occurred.

For some time past, because of an agreement giving the Navy responsibility for rigid lighter-than-air craft, and putting the Army in charge of the development of nonrigid blimps, dirigibles had not been a concern of the Air Service. On September 3rd, two of the Navy's finest experts in this field, Commander Zachary Lansdowne and Commander Charles Rosendahl, took off from Lakehurst, New Jersey, with a crew of 42 for an exhibition cruise over the Middle West. (Commander Rosendahl, incidentally, who is still an airship enthusiast today, was as zealous about lighter-than-air as Mitchell was about air power.)

Before dawn next morning, over Ohio, the *Shenandoah* ran into a bad line-squall. Despite a desperate battle to get the medium-sized airship out of the storm, she was torn into three parts. Commander Lansdowne and 14 men fell to their deaths. Rosendahl, in an outstanding display of courage and airmanship, managed to maneuver one section of the dirigible

as a free balloon and bring it safely to the ground, saving the lives of 27 men besides himself.

Coming only two days after the disappearance of John Rodgers and his crew, this second disaster to the Naval air arm raised a storm of questions all over the country. What was this rumor that Commander Lansdowne had protested against making the flight because of uninvestigated weather conditions, and had even predicted his own death to his wife? What about the charge that for "economy" reasons the *Shenandoah* had been underequipped with important valves?

It is interesting that to Secretary of the Navy Wilbur the two tragedies seemed to indicate, more than anything else, that the country had nothing to fear from any invading air power. "The Atlantic and Pacific are still our best defense," he said. Perhaps those words had something to do with the remarkable statement—and a prepared press statement at that—issued at San Antonio, Texas, on September 5th, which startled both Services.

It was 6000 words long, and starting off with one more of Billy's challenges that if this meant court-martial they could make the most of it, it said that such "terrible accidents to our naval aircraft . . . . are the direct results of incompetency, criminal negligence and almost treasonable administration of the national defense by the War and Navy Departments." Looking at the "disgusting" record was enough "to make any self-respecting person ashamed of the cloth he wears."

Mitchell pointed out that all aviation policies were made by non-flying men, that Congress treated the air arm as if it were nothing but an organization created for the benefit of the two departments; blasted at the fact that we still had to fly the old "Flying Coffins;" said we, the airmen, were so bluffed and bulldozed that we dared not tell the truth for fear of ruining our careers; and spoke of bureaucratic superiors who "either distort facts or openly tell falsehoods about aviation to the people and to the Congress."

He went on from there, ending with the thought that he personally desired no advancement, had had the "finest career that any man could have in the armed service of the United States . . . I owe the Government everything, the Government owes me nothing. As a patriotic American citizen, I can stand by no longer and see these disgusting performances by the War and Navy Departments at the expense of the lives of our people, and the delusion of the American public."

A couple of days later, a press aide at the White House replied to the eager Washington correspondents, "Yes, there will definitely be a court-martial."

Billy wrote me right away, and then wired me, outlining the records and papers he was bringing with him and establishing me as his liaison man. The night he and Betty arrived, I drove down to Union Station to meet

them. The word had spread, and a fife and drum corps of the American Legion were down at the station, with a large, pressing crowd. I had a tough time getting the Mitchells away in my car.

Affairs were complicated by the fact that before Billy, now relieved from duty, faced his own court-martial, he was supposed to be an ace witness before the Morrow Board, then sitting at the President's request to deliberate on the status of American air power. It seemed to many that the real purpose of this Board was to head off the year-long investigation headed by Congressman Lampert, so favorable to Mitchell's air power views as to be alarming.

The Morrow Board had, in addition to Dwight Morrow himself, some very reputable citizens on it, including General Harbord and Admiral Fletcher, my old associates Howard Coffin and Senator Hiram Bingham, Congressmen Carl Vinson and James S. Parker. Unfortunately, American air power received little benefit from the formation of this body, and very little from Billy Mitchell's appearance before it.

I can still remember how we all crowded into that room, with our wives, listening while Billy's expert testimony turned out to be not the brilliant defiance we had looked for, but a dry reading to the Committee of his own book, *Winged Defense*. It took me back to that other committee room years before, in 1913, when Billy had gone on lecturing and lecturing without noticing whether his hearers were interested or not.

We of the Air Service practically squirmed, wanting to yell: "Come on, Billy, put down that damned book! Answer their questions and step down, that'll show them!" But he read on and on like a schoolmaster until at last Hiram Bingham, friend of air power and former air officer though he was, became so restless that he said: "Colonel, in view of the fact that each of the members of this Committee has a copy of your book and has read it . . ."

Billy said sharply: "Senator, I'm trying to make a point!"

And that was that. Afterwards, I think Billy found most unforgivable the Morrow Board's curious finding about the relation between our Air Service and the maintenance of an American aircraft industry. (That, and the whitewashing of the D.H.'s.) "The Board urges the encouragement of civilian aircraft," said its final report, "and the sale of planes to foreign countries so as to *lessen the number* of planes which the Government must order to keep the industry in a strong position."

The court-martial was better, perhaps because everybody realized that a good showing was the best that could come of it. Billy was licked, of course, from the beginning. No matter what was said about "Air Power being on trial"—as it was, at times even in the eyes of the prosecution—the thing for which Mitchell was really being tried he was guilty of, and except for Billy, everybody knew it, and knew what it meant.

I have tried to think what new light I might be able to shed on that

famous court-martial, but I'm afraid there isn't any. It has all been pretty well told: how Major General Charles P. Summerall, originally president of the Court, was challenged by Billy on the grounds of bias and asked to be excused, shaken by the "bitter personal hostility" of Mitchell's confidential report on Hawaii; the brilliant efforts of Congressman Reid, Billy's defense attorney; the bellowing of Major Gullion as prosecutor; the way the nine Generals of the Court, now headed by General Howze, listened to the smallest argument in Mitchell's behalf.

Sometimes Billy and Betty would have gone riding before Court opened, coming in gaily and greeting the judging officers before they sat down (after all, most of the generals were old friends). MacArthur, and his alleged final vote on Billy's side; Frank McCoy, Blanton Winship, and all the others; the Air, Army, Navy, Press, and just Washington friends who jammed into that dingy old hall—it all was described daily then, and has often been pictured since. The thing I remember best is the way veteran airmen who suddenly appeared there at Billy's side from all over the country played up to him like an alert football team up against big odds but following the ball for the breaks. Before Gullion or Moreland, the other prosecutor, could even say "I object!" Spaatz or Herbert Dargue, Bob Olds, Gillmore, Schauffler, Gerald Brant, Horace Hickam, or one of us would have jumped in with the statement the prosecutor didn't want to hear. "What (question to Brant) would happen to Hawaii if such a refusal (referring to lack of cooperation between the Army and the Navy) came in time of war?" Quickly: "It would result in the capture of Pearl Harbor!" . . . "So you believe (to Spaatz) that the organization of the tactical units of the Air Service is being retarded by the War Department?" Promptly: "I do!" . . . To make sure they were backing up Billy's ideas, they wouldn't even paraphrase his words. General Howze asked Bob Olds somewhat sarcastically: "Do you think the General Staff should always listen to your recommendations?" "As the General Staff is now constituted, I do!" Bob replied. "How would *you* constitute the General Staff?" General Booth demanded. "On Colonel Mitchell's plan!" Bob answered quickly. The prosecution dismissed the witness.

Billy himself was in strong form at the trial, often putting the prosecution and even the Court on the defense. It was nothing like the Morrow Board. He could be as affable with a foe or a judge as with a friend, but he was a hard man to make peace with. He was a fighter, the public was on his side, he was righter than hell and he knew it, and whoever wasn't with him a hundred per cent was against him. Nights, we would adjourn to his apartment in the Anchorage where, with our wives, we would "plan the next day's strategy and talk things over."

The small gains—the only kind possible for any military expansion in those years of disarmament, he regarded as a contemptible compromise. Yet military aviation really couldn't have amounted to very much then,

even if everybody had agreed with him. Planes with performance, engines with reliability and the navigational aids were lacking. It was the man—the pilot—who was driving the plane to new records. The time of airplane performance, in fact, had not yet arrived. Air Power was still ahead of us.

Everybody knows how it ended. To find the sentence it wanted, the Court had to go back to post-Civil War days to the punishment of another military firebrand, George Armstrong Custer, who was also "deprived of his command and given half of his pay for a period of years." Billy's sentence was, of course, worse, since he was suspended from all military duties as well. He could scarcely serve under such conditions, and that President Coolidge would uphold the sentence was certain. There was nothing left for him to do but resign from the Army.

We all knew there was no other way — in accordance with the Army code, Billy had had it coming. But at the time we didn't think these things out. As the testimony of any of us who were called to the trial shows, the whole Air Service was angry. The first ones to try to keep the battle going were Major Herbert Dargue and myself. After such long service in Washington we had many friends, in Congress and in the press. We continued going out to Billy's house in Middleburg, and also over to Capitol Hill, and writing letters to keep up the fight.

At once the boom was lowered with a bang. After all the trouble with Billy Mitchell — and the case unpopularly closed — there was no thought of allowing small fry to keep it going. It was understood now that President Coolidge himself had been the prime accuser. We were both called on the carpet to answer for our "irregular" correspondence relative to changes in Air Service status. Dargue got off with a reprimand. I was, as the Press announced, "exiled!"

That was the end of my plan to resign and become president of our newly founded Pan American Airways. I couldn't very well quit the Service under fire. I was to be C.O. of the 16th Observation Squadron, at Fort Riley, Kansas.

In retrospect, I do not believe that

GENERAL MITCHELL
It was in a PW-8 that Lt. Russell L[usk fl]
Maughan made the famous dawn-t[o-]rancis

the War Department, as an agency, profited much, if at all, from the Mitchell "period of influence on air development." They seemed to set their mouths tighter, drew more into their shell, and, if anything, take even a narrower point of view of aviation as an offensive power in warfare. Our Navy, on the contrary, made a study of the entire affair and of all the incidents relating thereto, and became air-minded in a big way. They even went out of their way to find new means of using aircraft in naval operations.

* * * * *

After Billy Mitchell's sinking of the battleships in 1921, the sneers of those who continued to claim that it couldn't be done were not the important thing, as so many pro-air journalists have written. What was important was the way in which the implications *were* grasped in terms of their own limited mediums by elements in both the Army and the Navy. The Navy, as usual, was more alert to its own interests. The Royal Navy's converted carrier *Argus* had already attracted our Navy's attention, and one of the most immediate results of Billy's sinkings off the Virginia Capes was the commissioning, a year later, of the first real aircraft carrier in the world—the remodelled tanker U.S.S. *Langley*. In the next few years, the admirals and elderly naval captains who enrolled as flying cadets were indicative of an advancing frame of mind. Now, in 1936-38, the meaning of the B-17 struck home to the Navy with equal force.

STANDING BY PW-8

Russell L[ong] dusk flight from New York to San dawn-to[day] Francisco on 23 June 1924.

In the Army, there were no responsible quarters, either, who still doubted that the airplane had become an indispensable military weapon. But that meant as direct troop support, aerial reconnaissance for the ground forces, communications, and transport. Bombardment on its own, to some extent—yes. But the twin-engined B-10's and B-12's seemed good enough for that. No powerful sympathy for the "independent air mission"—the kind of strategic air campaign which the B-17's and B-24's over Germany, and the B-29's over Japan were to carry out—existed in the War Department.

The best efforts of Malin Craig, when he was Chief of Staff, the ups and downs of Secretary Woodring's

understanding, never changed the basic conviction of the Department that allocation of the skimpy funds it had for the purchase of airplanes should be put into medium bombers and other ground-support planes. Even when George Marshall first took over in 1937, he needed plenty of indoctrination about the air facts of life. The difference in George, who presently was to become one of the most potent forces behind the development of a real American air power, was his ability to digest what he saw and make it part of as strong a body of military genius as I have ever known.

The words of an official War Department spokesman at the July, 1936, hearing which I mentioned above, are a good example of the typical Service attitude toward air power at that time. Brigadier General Stanley B. Embick himself was not too much to blame, since he was voicing only the "party line" of the General Staff. In the course of a familiar speech in which he assured the committee that neither the United States nor Japan "can be subjected to a hostile air invasion," he spoke, as they always did, of the "peculiar elements."

"With respect to the analogy between the land and sea forces, it should be said that the land and naval forces operate in elements which nowhere overlap. The line of demarcation is the coastline. But throughout its entire extent, the element of the air forces overlaps the element of either land or the naval forces.

"Each of the latter forces remains permanently in its peculiar element, and each can gain and maintain exclusive control of its own element.

"On the other hand, an air force can remain in its peculiar element for only a short time; it must rise from and return to the element of one of the other two forces, and it cannot control any element, even its own, except temporarily, throughout a limited area. So an air force cannot obtain a decision against troops on the ground, nor occupy territory nor exercise control of the sea."

This was some thirty-seven months before Hitler invaded Poland. On these occasions, nobody was ever rude enough to remind the official spokesman that all seaborne vessels, except the accursed *Flying Dutchman* (even stationary lightships), also have their bases ashore. This sort of thing, the division of responsibility at the shoreline, went on until the idea was blown up by Jap air power at Pearl Harbor.

In 1928, Mason Patrick, retiring as Chief of the Air Corps, had complained that "the Air Service, or rather the air effort of the United States since we entered the World War has probably been the most investigated activity ever carried on by the United States Government."

True, and though we couldn't see it then, it worked out to our benefit. The jurisdictional dispute—"Who the hell is going to run this thing anyway, and why?"—was the great bequest Billy Mitchell left us. More than anything, its continuance kept us alive and lively, because it was never settled.

* * * * *

The four-engine bomber was the first positive answer to the need arising from the United States' modification of the Douhet theories, which we

had been teaching as an abstract science at the Air Corps Tactical School for several years. Ever since Versailles, Germany had been considered the next enemy by most strategists, including Billy Mitchell, whose notion, however, that Japan would come flying to attack us "some fine Sunday morning" was less heeded.

The large bomber was the center of the "bomber controversy." If one thinks of the state of the world in 1936, the year the Spanish Civil War began, the year after Mussolini invaded Ethiopia, the year immediately before Japan went into China proper, the year in which Hitler's remilitarization of the Rhineland took place, it would seem that the time was overdue for some kind of clear-cut thinking about American air power to have started in the War Department. It hadn't. And in that connection, this is a good place to note one or two facts that are sometimes oversimplified.

Despite popular legend, we could not have had any real air power much sooner than we got it. By that, I mean the genuine nucleus of air power, able to expand quickly enough to meet whatever demands were made upon it, that was foreshadowed technically by the appearance of the four-engine bomber, and which was to obtain its real Magna Carta in the office of President Roosevelt on September 28, 1938.

Unbelieving men in high places, battleship admirals, generals, and others who seized on Billy Mitchell's sins to eliminate him, didn't eliminate air power at all, nor retard it half so much as has been said. Actually, they didn't even eliminate Billy. They broke his heart, but from the day of his trial, public opinion was mostly on his side. The point is, that kind of public opinion couldn't help air power then in any conclusive degree, and no other kind of public opinion was ready.

* * * * *

There were three Billy Mitchells: there was the man they court-martialed, not personally known to the public, who wouldn't rest until he became a martyr; there was Mitchell the air prophet, not in the sense of popular but of highly scientific forecasts. And then there was the third Mitchell, who included the first two, but added something. This was the Billy the public loved, and whom the Air Corps loved. Quite aside from his fine war record and his leaping mind, this Mitchell was the hero who had always had the American public on his side—the dashing, colorful doer-of-deeds who cut red tape, defied the stuffy boss, snapped his fingers in the face of authority, cried, "What, I can't sink your ships?" and sent them to the bottom; exposed the evil interests, paused in the midst of it all to marry the charming girl, and in short, did everything Billy did. After he had gone too far, for a man in uniform, and his superiors had crushed him, the public and the Air Corps still loved him, and Billy, in cits, went right on fighting. But the point I want to make is that a different outcome to the trial might not have had any immediate effect. People have become so used to saying that Billy Mitchell was years ahead of his time that they sometimes forget it is true.

SAC HISTORY: m

It is significant to note that SAC is using the peculiar advantages of the study of history to do two things which have long been recommended by historians not directly associated with the operations of the military: the continually dramatic story of SAC is being used in the public relations program, and for quick background information for investigations, Congressional Subcommittee Hearings, for presentation before Congressmen . . . .

By
E. R. CAYWOOD
and
ROBERT M. KIPP

Y: management tool

IN THE BEGINNING

B-29's fulfilled the concept of a strategic bombing force.

A general impression manifest on the layman at the mere mention of the term "history" is one of hallowed walls of creeping ivy, or realms of antiquity. In the January 1959 issue of *The Airpower Historian* we presented an outstanding thesis on the use of history, propounded in common terminology, deflating the pompous attitude usually attributed to the study of history. We followed this up with another article on the use of history by federal historians and military historians, once again cached in more or less general terms.* The following article written by two Strategic Air Command historians, relates in greater detail some of the specific use that is being made of history and the study of history in SAC, and can very well serve as a guide for personnel concerned with history in various other units of the Air Force.

Mr. E. R. Caywood received his B.A. from Northeastern State College, and M.A. from the University of Oklahoma. He is a veteran of World War II and has been associated with the Air Force Historical Program since 1952. He is currently serving as Deputy Chief, Historical Division, Headquarters, Strategic Air Command.

Mr. Robert M. Kipp received both his B. A. and M. A. from Ohio University. Like Caywood, he too is a veteran of World War II, and has been associated with the Air Force Historical Program since 1955. He has also been an historian in the Air Materiel Command, Air Rescue Service, and currently in the Strategic Air Command.

History in the Strategic Air Command serves one main purpose—a tool of management for the commander and his staff. It is the documented record of the unit's capability to effectively accomplish its assigned mission. The ultimate basis of any good history is **facts.** Unbiased historical records, by revealing lessons of the past—the mistakes, accomplishments, causes, results, and recommendations—enable commanders and their staffs to approach problems more objectively and make intelligent decisions for future programs.

The coverage of SAC's activities is accomplished by professional civilian historians, through semi-annual histories prepared at the command, numbered Air Forces, and overseas Air Divisions headquarters, and monthly histories written at the continental United States Air Divisions and special unit levels. The historians at Headquarters SAC also prepare specialized monographs on varied programs of the command.

Program of Cooperation

Use of history in SAC is mainly the result of effective cooperation on the part of the historians and the commanders. The personal interest of the Commander-in-Chief, General Thomas S. Power, in history has given the historians access to data dealing with top level command decisions, which has in turn greatly increased the value of the history.

The historian must be a competent researcher, writer, and educator. He has an excellent product, but he must explain its value as a tool of management to the commander and his staff. Too often the Air Force historian waits for people to beat a path to his door pleading to use historical information. The historian must not confine his efforts to writing history. He builds a firm reputation for his program not only by the

* "What Use is History," and "The Federal Historian—Vital, But Seldom Understood,"—**The Air Power Historian,** January, 1959.

quality of his writing, but also by the diverse ways in which he puts his research talents to use to assist the staff in better accomplishing the organization's mission. This in no way prostitutes the historian's art. To achieve this situation, the historian must constantly explain the history as a tool of management. He cannot do this by remaining in an "ivory tower" oblivious to the daily "pulse beat" of his unit. It is essential for him to attend important conferences and staff meetings, perform research in major files, and get to know key staff officers. Not only is this necessary in order to produce a quality history, but also to give the historian a chance to make himself and his "product" known and to explain history and the service he is able to perform.

The documented research report (or historical study) has moved from the classroom and research laboratory into use by every facet of American life. The growth of the technical professions, the extraordinary increase of great business organizations, and the widening scope of municipal, state, and federal governments have all led to the increased need for objective, comprehensive research studies. As they grew in size the larger organizations demanded greater specialization. Their executives became increasingly dependent upon subordinates and experts. Subsequently, the complex system evolved in which many intermediate positions formed a connecting chain from the lowest subordinate to the organization head. So, there developed the written research study, the result of thoughtful analysis and interpretation of many documents, needed to carry the specialist's information to the policy makers and to provide a permanent record. The managers of the Nation's great industrial concerns rely on the research study as the primary source for providing them with an objective approach to their most vexing and most important problems because these documents remove much guesswork from decisions that formerly were made by intuition. The Department of Defense and other major Government agencies spend millions of dollars annually for documented reports on which to make vital decisions affecting national defense and ultimate survival.

The Strategic Air Command is one of the biggest businesses in the United States, larger than General Motors in assets and personnel. The SAC commander, whether he commands a tactical bomb wing, an air division, or an air force, is very much like a modern business executive. He must read hundreds of documents and rely on them in making decisions and in solving problems essential to his mission. Time is a major factor in his daily work. A careful reading of his history is, therefore, a valuable time-saver, since this document can provide him with essential data dealing with all the major activities in his unit. The unit history, the result of accurate observation, competent analysis, good judgment, and free from preconceptions, is a good tool for more efficient management of the SAC force at all levels of command. Tables, charts, and other statistical

B-58 — HOT PLANE FOR A COLD WAR

Lessons learned from super fortresses and super super fortresses demonstrated the need for exquisite speed, maneuverability, and range.

information are not enough. Raw facts must be interpreted and evaluated. Significant items must be extracted for emphasis, and meanings added. It is the historian's job to winnow the mass of documents and to secure an authoritative and accurate record of each unit's capability to carry out its mission. The unit history is a permanent record not only of the organization's life, but of command decisions. It is a ready storehouse of information, not only of the distant past, but of the immediate past, useful to the commander and his staff in preparing staff studies, papers, speeches, and briefings.

History and Experience

Any man learns from experience, but the wise man learns from the experience of others; and history for one thing, is the recorded experiences of human endeavors. As Sir Winston Churchill said, "without a knowledge of history, no man can understand the problems of our time." USAF historical studies document strategic air operations from the beginning of doctrinal concepts through World War II, the Berlin Airlift, the Korean Conflict, and the recent international crises relative to Suez and Lebanon. SAC histories not only treat broad developments of a global nature, but they also cover more specific command programs calling for exhaustive special studies. These include such areas as the ballistic missile program; integration of new weapon systems such as the B-52, B-58, and KC-135 into the force; survival programs such as dispersal and alert; global communications; problems concerning overseas base rights; sophistication of nuclear weapons; new operational techniques; and personnel stabilization programs. The historical

function also provide background material for staff officers in their presentation of SAC programs to high-ranking Government officials, military commanders, ambassadors, foreign dignitaries, educators, industrial leaders, clergymen, and other leaders.

The histories prepared by SAC units are used, not only by their own organizations, but also at the numbered Air Forces, SAC and USAF headquarters and other Government agencies as sources of information, evaluation, and analysis that save time, money, and effort. They are used throughout the Air Force educational system, especially in the Air University and in the Reserve Officer Training Program. They are used at every echelon to orientate new personnel and to build *esprit de corps,* Specific sections and chapters of the SAC headquarters and subordinate command histories are circulated throughout the staff, where they are reviewed as sources of information relative to specific projects. Portions, or complete histories, are made available to persons on a need-to-know basis, for permanent retention.

The SAC headquarters maintains a careful record of the hundreds of instances in which the histories have been used by management. Many commanders and their staffs read their unit history at the end of each month in order to better plan future programs. The reading of the history by the rank-and-file has made them realize the important part they play in accomplishing their unit's mission, and their contribution to SAC's global program. The SAC Historical Recognition and Incentive Program, which honors those units and histories that do outstanding work, has improved the quality of unit histories and increased their value as excellent sources of information.

Specific Uses Of History

The following are some specific examples of the utility of the SAC history :

1. Prior to his unit's deployment to England, a bomb wing historian prepared a study on the unit's training problems since its reactivation. This study was used as a basis for a presentation by the wing commander to the Seventh Air Division staff.

2. Numerous requests are made of the units for information contained in documents now retired, except for the copies in wing and air division histories. These queries include what objectives were for given periods, figures on training, reenlistment rates, authority for organizational changes with spaces authorized, number of crews assigned as of a certain date, problems adversely affecting combat readiness, etc.

3. There are numerous instances when unit and higher command histories are reviewed for information by other Government agencies, aircraft industries, and private research organizations, e.g., Rand Corporation. These requests for data include supply deficiencies, aircraft production and modification programs, contracts, operational concepts, intelligence materials, budget figures, personnel records, training techniques, etc.

4. An urgent request by the

Comptroller's office for data on the activation of an Air Force base and its units to be used in testimony in a Congressional hearing.

5. During a recent Congressional inquiry involving supply deficiencies in the Arctic area, histories of units stationed there contained essential data needed by investigators to prepare constructive recommendations for solving the problem. It would have taken a trained research staff several weeks to have provided this information. The histories saved the Government many man-hours and thousands of dollars.

6. Certain portions of the histories, i.e., maintenance, supply, personnel, operations, facilities, etc., are reviewed by newly assigned officers who are responsible for those functions. These reviews enable them to understand their job better and to make more intelligent decisions in operating their programs. Many man-hours of training are saved as a result of these reviews.

7. Specialized military activities continue to grow in the Defense organization. The histories of units participating in such projects are in demand by the Air Force and other segments of the Defense Department. As an example, the Aeronautical Chart Service urgently needed specific information on isogonic magnetism in the Arctic. To obtain this data one of SAC's numbered Air Forces prepared to deploy a complete strategic reconnaissance squadron to Alaska on extended TDY. However, in the staff discussions concerning this operation it was decided to consult histories of units who had previously been on duty in that area. These well documented studies included the needed information. The Air Force thus saved in terms of dollars, the amount it would have taken to deploy a squadron to Alaska, maintain it there for a period of over a year, and deploy it back to its home station.

Within SAC the relationship of Information Services and History has worked well. The information program is deliberately directed toward two objectives: to increase public understanding and support of the air power mission, and to sustain the dedication of SAC's personnel to the vital command mission. The historical function provides a wealth of factual data in attaining both goals.

An understanding of the traditions of their units, as related in the histories, fosters the pride of SAC personnel, creates *esprit de corps*, and motivates their desire to pursue an Air Force career. The histories treat fully the stated requirements of commanders, analyze how they were achieved, the present valuable lessons concerning what avenues of approach should be used in winning support for their fulfillment from the military and public segments of our society. Information officers use SAC histories, realizing they are the only documents available anywhere which give a factual account of the command's activities from its inception to the present. The historical function is the only agency in SAC which maintains a permanent archives. These documents, including graphic materials, supplement the histories

for the retention of valuable information.

There are many facets of Air Force activities which are unclassified and can be transmitted to the general public. The dramatic effort of supplying Berlin with the necessities of life was a thrilling chapter in the current "Cold War," and is an example of events which can be given wide distribution.

The experiments of space flight, missile development, global operations, and the humanitarian endeavors of the Air Force are other activities which the public finds interesting. But even more important in this phase of the historian's responsibility is the challenge of analyzing for the layman those aspects of the Air Force which must be presented to the public if our citizenry is to make decisions based on full knowledge on matters affecting national security and ultimate survival.

The sole and rightful criteria that determines the historian's status is his contribution to the overall accomplishment of the mission. SAC history is a recognized tool of management. If it has become a "stepchild" in some Federal agencies, at least fifty percent of the blame must rest on the shoulders of the historian himself. The average SAC officer is intelligent and eager to perform his job in a more efficient manner. However, he takes a pragmatic approach to the historical service. When shown of what value it can be to him, he supports it. This support and use of history at the unit level forms the strong foundation upon which the entire SAC history program is built. If it remains strong at the lowest echelon of the using organiaztion, it will remain equally strong at the highest level.

PILOT TO CREW

SAC Warrior John F. Hurley, Jr. prepares to transmit message from his B-36. By keeping the past in sharp focus, SAC is able to insure flexibility and efficiency.

Historical Fellowships

An announcement of January 30, 1959, by the United States Department of Health, Education, and Welfare concerning the first graduate fellowships under the National Defense Education Act reveals that the program will provide 160 fellowships in 1959—1960, of which eleven will be in history at Duke and Emory Universities and at the University of Kentucky. Additional fellowships may be awarded in 1959—1960. After 1959—1960 the Act authorizes fifteen hundred fellowships for each of the three subsequent years. Fellows receive $2,000 the first year, $2,200 the second, and $2,400 the third, plus $400 per year for each dependent. Reimbursement to each school is also authorized to a maximum of $2,500 per fellow.

Did You Bomb Ploesti?

The human side of the Low Level Battle of Ploesti (1 Aug. 1943) will be presented in a forthcoming book by James Dugan, noted free-lance writer, and Cal Stewart, Nebraska newspaper publisher. Stewart this year has travelled 35,000 miles in 28 states in researching the intimate story. In addition, Dugan and Stewart interviewed more than a hundred survivors immediately after the mission. The authors served in Air Force Public Relations during World War II.

Dugan's books include *The Great Iron Ship*, a book club selection and best seller; *Man Under the Sea*, published in seven languages; *Undersea Explorer;* etc. He wrote the documentary academy-award winning film, *The Silent World* (Columbia Pictures, 1957). Stewart, formerly of the 93rd Bomb Group, has been publishing at O'Neill, Nebraska, the past 13 years.

Any personal material (diaries, pictures, etc.) of participants may be forwarded to Cal Stewart, Box 631, O'Neill, Nebr., or to James Dugan, 245 East 21st, New York 10, N. Y., and all material loaned will be carefully returned.

The co-authors are concentrating on the close-up and intimate anecdotes yet the reader will, for the first time, have full background of the conception, detailed and heavy planning, and brave execution of one of the greatest military battles of all time.

QUESTIONNAIRE

Name .....

Group (as of 1 Aug. '43) .....

Present Address .....

Rank or Grade (as of 1 Aug. '43) .....

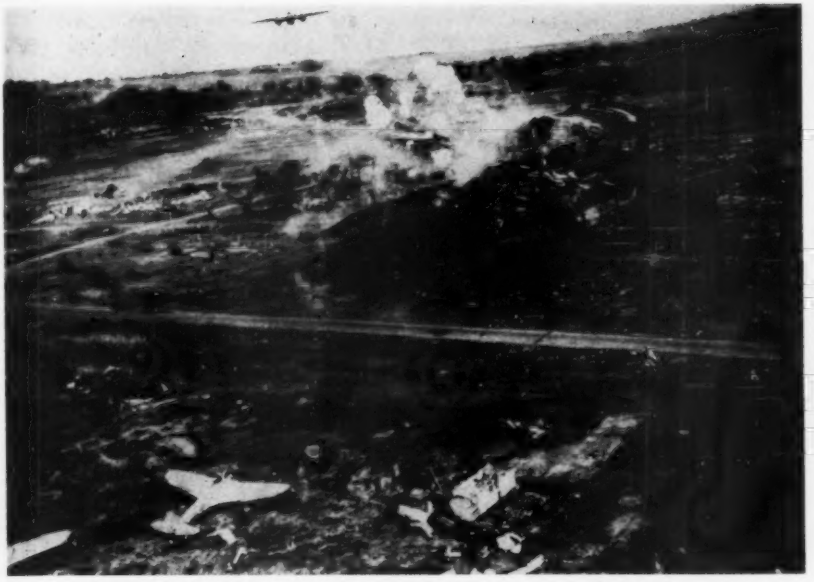
Nickname of a/c .....

Name of a/c commander .....

Other members of crew, positions, if they can be supplied; last names, nicknames very helpful.

Place in attack formation, or describe as your memory serves you. What happened?
Do you have any pictures (attack, formation, prisoner, internment, etc.)?
Are you in touch with any crew members or friends who also flew?
Your present status (military or civil).

Miscellaneous.



BOMB RUN ON JAPANESE HELD CLARK FIELD
Once the aerial pearl of the Orient, by early 1945 it was reduced to shambles.

Postmarked Manila

Written by Anna McGurk on 1 June 1945 in Manila, this letter was furnished The Airpower Historian from the historical files of the XIII Air Force Service Command. Miss McGurk wrote the letter to her sister, Mary McGurk, who was residing in Tacloban, Leyte, Philippine Islands at that time, Several months previously Anna had left Manila by sailboat for their farm at Masbate, in order to secure food. She was never able to return to Manila.

When the American pre-invasion aerial offensive over the Philippines began, Mary fled to the back-country in Masbate, and joined the guerrillas with whom she lived barefooted and on a frightfully restricted diet. After the Americans were secure in the Southern Philippines, Mary was able to return to Tacloban. This was the first letter which she received from her sister Anna.

Some of the originally misspelled words have been editorially corrected; however, the reader may now and then detect signs of stress and strain by the manner of writing and small degrees of incoherence.

Manila
June 1, 1945

Dear Mary,

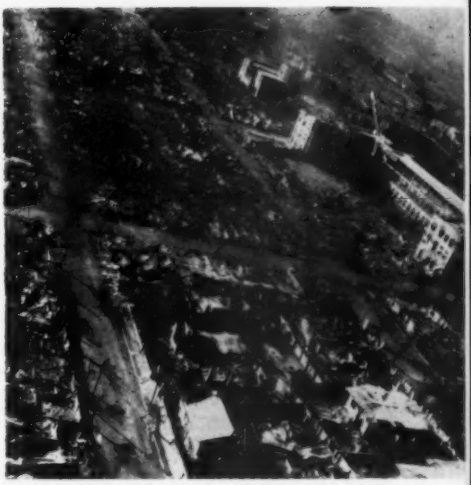
I have encountered so many experiences in life since the time you left, that I don't know anymore where to start. My memory fails me at times, so I can only wonder if I am shell-shocked still.

It is a great regret to tell you that our house and everything burned with it, and I am here now, staying at Santa Ana with Martina. Every house on Leveriza Street went, and so did very many women and children. That night of the fire, I thanked God that the two boys were in Bulacan, as the Japs were taking men and boys and were killing all the people they saw on the streets. I had been alone with a servant for nine days before the shelling, and the day after the Americans occupied North of Pasig River, the Japs began burning houses. Fortunately, Noli Aragon and his wife Josie came to stay with me. At around eleven that night I heard people screaming, and when I got up, I saw a fire in Agno. Then Juanito, our servant, saw many Japs hiding in the alley between our house and Mr. Gray's. Fires started here and there, and the next thing I saw was Chita's house burning. Juanito and I had no more time to pack up, so we grabbed anything we got hold of. My plan with the servant was to run to the tennis court, but Noli and Josie dragged me to the street while Juanito was already on the other side of the fence searching for me so we could run to the interior, as the Japs in the alley were shooting desperately at the people running out of their burning homes. When we approached the gate, about ten of them shot at us. I thought it was the end of me. At that moment I dropped myself on the ground pretending that I was hit, with bullets whizzing close to both sides of my head. If I moved half an inch to either side, I would have been gone.

They left us, and suddenly Josie groaned and said that she was hit on the leg. We crawled back under our house and felt sure that we would have to burn with it. When we saw people running out, we took another chance. I was the last one in the crowd, and too weak to carry the few things I grabbed, as I was terribly nervous. The Japs stood and stared as I passed them and I thought it was a miracle that they did not shoot. This time we were heading for the market, and all of a sudden another group ahead of us began firing.

Women and children were dead on the street and many in front of me caught it. So I told Noli and Josie to go their way and I'd go mine. Then I turned into the alley by Juanito's house, to the tennis court. When the Japs saw all the people going that way, they began shooting at us again. I hid under the merry-go-round until I felt sure that they were gone. Afterwards I found Juanito and then Noli and Josie. We were surrounded with fire and I cried as I watched the house burning down. I thought of the sweet, happy times we had with mother, and the beautiful things Frank brought from Shanghai, that I wished I had stayed to burn down with it. (Brother Frank had been taken prisoner by the Japs at Shanghai in the early stages of the war, and was never heard from again.) The following morning Noli begged me and Juanito to help him carry Josie to the hospital on a cot. On our way we were nearly shot twice, and after we delivered her to the De Los Remedios Hospital, the nurses cried and coaxed me to stay, fearing that I might get shot on my way back. I worried about our few things that I saved, especially the important papers. I stayed, and Juanito went back to take care of the things.

Well, we were shelled day and night for eight or nine days. Every time I went to sleep, I prayed and cried without hopes of waking up again. The last two days shattered the hospital I was sheltered in. Mrs. Ochoa took care of me like her own daughter. We were getting desperate, and tried our luck in going across the street in the open field on the corner



CROSSROADS OF DESTRUCTION IN THE PACIFIC

Manila, February 1945. Anna McGurk, as most residents of the destroyed city, was forced to live in terror. Terror lurked in pestilence and in the roving Jap.

of San Andres and Carolina streets. Dead people in the hospital were piled up on top of each other. Father Lollar was killed in the operating room which was hit three times. Every now and then the Japs came, threatening us with machine guns. I saw so much blood and dead people that I didn't care if I was next to get killed. During those days, the Americans shelled us on one side and the Japs on the other. I was still more thankful that the two boys were not with me. It surely reduced the people to one-third on our street. The place where our house stood has two craters.

It was beyond our dreams that the Americans, who were behind the ruins in the tennis court, had sent for

us because they planned a worse shelling in the afternoon. I crazily laughed, shouted and cried as I ran. I hid each time I heard a machine gun because the Japs did not want us to reach the Americans. The first American I saw happened to be short. That made me think he was a Jap, and I ran away from him. He followed, and gave me a good laugh, and then led me to the market. The Japs at San Andres Elementary School machine-gunned us, and I hid under the fish stalls. That was the day our beloved boys came back! Now I'm having such a fine time with them that I don't want to be repatriated to the States.

Father Kelley, Father Manahan, Father Fannigham, Jake Sullivan and two service boys were taken to Syquia Apartments to be burned to death. Father Connely, the priest who plays the organ so well, was in Cavite during that time. He is leaving on Saturday for the States, and then to Ireland. The Japs did not forget to burn our beloved church. Mr. Cruicksank, according to someone who was with him, died in the Bilibid prison shortly after the fall of Corregidor. Mr. Wilson is O. K., but he nearly died of starvation at Los Banos internment camp. Patsy's stepfather died and many others — all of starvation. Thank God, Father did not live long enough to see such cruelty!

Give my regards to Dr. Quilling and tell him that no Jap laid his hands on me. I know of only one case on our street, and that was the Canillas family. They abused the seven girls, killing them all afterwards. I was sensible enough not to wait for them to drive me out; otherwise, you can imagine all the worst things that could have happened.

I've gained twenty pounds since the Americans came. It is not what I eat; it is the feeling that we again have freedom of speech, and I guess it is the spirit of liberation. We have no more fears.

Well, Mary, let us thank God that we are safe and pray to Him to bring Frank safely back. Mother really would not have died had this war not broken out. She simply worried about him till her resistance became too low.

Write soon, and let me know when you are coming back.

Anna.

Tearing the Veils of Obscurity

—MAJOR GENERAL FRANK M. ANDREWS TO — NATIONAL AERONAUTIC ASSOCIATION ST. LOUIS, MO. — 16 JANUARY 1939

No one knows better than you gentlemen, that Air Power is not a commodity that can be procured in the open market, no matter how much gold and silver may be available. Money will not buy it; desire will not create it. Timely foresight based upon an intelligent conception of the potentialities of Air Power and its effect upon the destiny of nations, is the only formula that can assure its development.

LETTERS TO EDITOR . . .

Dear General:

After reading Colonel Driscoll's article in the January number, "Impact of Weapons Technology on Air Warfare, 1941-1945" with your added commentary, I am moved to write to tell you what an excellent contribution you and Colonel D. together have made. This subject of the relation between tactical problems and design change has long been of interest to me as you may know if you have read my book, *Ideas and Weapons*, which the Yale Press published in 1953. I was so much impressed with the article and commentary that I made it into a lecture for presentation before the local A.F. Reserve unit to which I'm attached. It provoked a most useful discussion, so you can see that the impression made by your efforts extends rather further than your subscription list may lead you to believe.

Let us hope there will be more articles on this general theme from time to time in the future.

Sincerely,
I. B. HOLLEY, JR.
Duke University
Durham, N. C.
24 June 1959

Dear General Anderson:

The officers of the 4080th Strategic Reconnaissance Wing, Laughlin Air Force Base, are unanimous in the opinion that our Dining-In Night of 19 June was an outstanding success. Furthermore, the officers attribute this success to the forthright, informative, and authoritative address you rendered.

I have found here at Laughlin a group of outstanding young Air Force career officers. They are engaged in a challenging and most important mission. The opportunity they had to be with you last Friday night will enhance their careers and cause them to do a little more independent thinking.

The 4080th Strategic Reconnaissance Wing thanks you for the services you rendered us in being our principal speaker at our Dining-In Night. We hope you will visit us again in the near future.

With kindest personal regards and best wishes, I remain,

Sincerely yours,
A. J. BRATTON, JR.
Colonel, USAF
Commander
Laughlin AFB, Texas
16 June 1959

Dear General:

Enclosed find check for fifteen dollars and a correct address card. Does this make my membership account current?

Up until now, I have always felt quite bitter concerning the Foundation strictly because of the way I was introduced to it. In 1953 or '54 the Commanding Officer of the base where I was then assigned passed the word that it was mandatory for each one of his officers to become a Charter member of the society. This got me as well as many of my fellow officers off to a bad start with the Foundation. Since this is now all "water under the bridge" it is my desire to support you and the Foundation 100 percent. I only hope future Commanding Officers do not follow these examples in selling the organization to newly integrated officers in the Air Force. I feel The Air Force Historical Foundation can stand and survive on its own merit very well—your Quarterly Reviews, *The Air Power Historian* are excellent. I read them and enjoy them very much.

Sorry it took me all of these years to get the "chip off my shoulder."

Sincerely,
NAME WITHHELD
Lt. Colonel, USAF
APO 11, New York, N.Y.

RECENT BOOKS

The Air Force Blue Book: The USAF Yearbook, Vol. 1—**Tom Compere,** Editor. New York: Military Publishing Co., 1959, $1.00. Invaluable handbook of information on all activities and commands of the Air Force.

Aron, Raymond, On War, New York: Doubleday, 1959, $3.50. Aron considers the military possibilities facing the world, total peace, total atomic war, or many small nonatomic wars. His hope is to be able to limit wars until war can be avoided altogether.

Beaty, David, Cone of Silence, New York: Morrow & Co., 1959, $3.95. Novel of commercial jet airline company by former BOAC pilot.

Caidin, Martin, Spaceport U.S.A.: The Story of Cape Canaveral and the Air Force Missile Test Center, New York: E. P. Dutton & Company, Inc., 1959, $4.95. Highly illustrated and readable account of the Air Force Missile Test Center and Cape Canaveral.

Cooper, General Merian C., Chennault of China, New York: McDowell, 1959, $5.00. Biography of this famous pioner in the history of aviation, whose ideas were far ahead of his time. Written by his Chief of Staff.

Dictionary of Guided Missiles and Spaceflight, Grayson Merrill, Editor. New Jersey: D. Van Nostrand Company, Inc., 1959, $17.50. A comprehensive authentic dictionary of words and terms most commonly used today in the field of guided missiles and spaceflight.

Frazier, Paul Wilson, Antarctic Assault, New York: Dodd, 1959, $4.00. Describes Operation Deep Freeze which prepared seven bases for the International Geophysical Year.

Hyde, Margaret Oldroyd, From Submarines to Satellites, New York: Whittlesey House, 1959, $3.50. A survey of progress of technology in the development of military weapons and research being conducted by the Armed Forces.

Kenney, General George C., Saga of Pappy Gunn, New York: Duell, 1959, $2.95. A biography of Col. Paul Irvin Gunn.

Kinney, William A., Medical Science and Space Travel, New York: Franklin Watts, Inc., 1959, $3.95. The flight surgeon seeks an answer to man's reaction to an outer space environment.

La Croix, Robert De, They Flew the Atlantic, New York: Norton, 1959, $3.95. First attempts to cross the Atlantic.

Man In Space: The United States Air Force Program for Developing the Spacecraft Crew, Lt. Col. Kenneth F. Gantz, Editor. New York: Duell, Sloan and Pearce, Inc., 1959, $4.00. The authoritative and comprehensive story of Air Force research, development, and tests in the fields of aero-space medicine and human factors.

Montgomery, Rutherford and Lt. Col. Grover Heiman, USAF, Jet Navigator Strategic Air Command, New York: Dodd, Mead & Company, Inc., 1959, $2.75. A novel about jet navigator training and crew duty and the role of the navigator on combat ready B-52 SAC crew.

Scott, Robert Lee, Flying Tiger: Chennault of China, New York: Doubleday, 1959, $3.95. Story of the debater par excellence on the relative merits of fighters and bombers.

Recent Articles

Berkner, L. V., "Government Sponsorship of Scientific Research," Science, Vol. 129, March 27, 1959, pp 817-821. Proposal for a cabinet-level department of science.

Boone, Admiral W. F., "NATO—Keystone of Defense," U.S. Naval Institute Proceedings, Vol. 85, April 1959, pp 23-37. Gives missions and organization of NATO with the comment that NATO may review its first ten years with a sense of solid accomplishment.

Bruccoli, Matthew J., "Smithsonian Pilgrimage," Flying, Vol. 6, March 1959, pp 42-43. Comments on this aviation collection.

Cahn, R., "Our Plans for Outer Space," Saturday Evening Post, Vol. 231, February 28, 1959, pp 25. NASA's plan for Project Mercury.

Chisholm, Brock, "Biological Warfare: A Demand for Answers," Bulletin Atomic Scientists, Vol. 15, May 1959, pp 209-211. Citizens must know the threat and the government, lacking adequate defense, must make proposals for world peace through world law for our consideration.

Bryant, Peter, Red Alert, New York: Ace Books, Inc., 1959, $.35. A gripping novel about the men of SAC and the combat crews on their deadly missions during the first two hours of **World War Three.**

Constance-Babington-Smith, Air Spy, New York: Ballentine Books, Inc., 1959, $.50. — the dramatic story of the beginnings and development of air photo reconnaissance during World War II.

Knoke, Heinz, I Flew For The Fuhrer, Introduction by Lt. Gen. E. R. Quesada, USAF (Ret), New York: Berkley Books, 1959, $.35. The personal story of a German fighter pilot and his interpretation of the European air war.

Scott, Brigadier General Robert L., Jr., USAF (Ret), Tiger In The Sky, New York: Ballentine, 1959, $.35. A collection of air adventure stories based on the author's thirty years of flying in the United States Air Force.

Fedorov, E. K., "Some Lessons of the International Geophysical Year," Bulletin of Atomic Scientists, Vol. 15, April 1959, pp 155-159.

Airpower Book Review

THE IMPACT OF AIR POWER, by Dr. Eugene M. Emme: D. Van Nostrand Company, Inc., Princeton, N. J., 1959, $12.50.

This unique publication can give great profit to any serious student of the current global conflict. To give its best returns it should be kept in a position that will favor ready reference to the vast array of related subjects that are presented in this single issue. It does not require that it be read in chapter sequence to give it meaning. Each selected paper covers the views of its author without sequence linkage to those that precede or follow. For that reason it is tailored well to limited reading time allocations.

The content of the book treats with almost every major factor in both the political and military categories of conflict, albeit, with a major emphasis on the **Impact of Air Power,** by authors eminently qualified to reason on the specific subjects of their choosing.

The author has performed a singular service to those concerned with current conflicts, now global in dimension, in his extensive research and final assembly, in a single volume, the reasoned views of a major segment of the policy makers of modern times. In his introductory treatment of the subject of each successive chapter he performs outstandingly well in diagnosing the subject and orienting the reader to the papers selected for that chapter.

We have waited a long time for a book such as **The Impact of Air Power.** Not

only does it document the basic assumptions underwriting any appreciation of the influence of third-dimensional mobility in warfare and diplomacy, but it does so in a manner stimulating thought-in-depth.

It helps us to understand where we have been, where we are, and, hence, where we might be headed.

O.A.A.

MEDICAL SERVICE AND SPACE TRAVEL, by William A. Kinney, New York: Franklin Watts, Inc., 1959, $3.95.

This small volume by scientific editor Kinney is an amazingly complete and concise summary of the efforts and contributions of medical service in preparing man to venture into outer space. Seventy action photograph illustrations complement the text and present many examples of the intricate equipment required and developed in the search for solutions. Total reading time is only about two hours.

In reporting on problems and their solution author Kinney reflects an attitude of cautious optimism, and General Armstrong in his introduction comments: "It has been a long countdown." However, the spirit of inevitable success pervades throughout the book, and the reader cannot escape the excitement of anticipating the first voyage by man into the mysterious unknown.

New problems and conditions to be encountered for the first time when man travels in space and in orbit are presented. Physical and psychological requirements of the spaceman, the packaged environment of the space craft, weightlessness, solitude and confinement, clothing, food and drink, silence, temperature and radiation hazards are stressed.

The book is interestingly and simply written and explains the basic principles of problems anticipated in manned space flight without exhaustive or detailed technical elaboration. With its last-minute information on research progress and current knowledge, it provides a quick, up-to-date familiarization with medical service's participation in preparation for space travel.

Walter A. Carlson
Colonel, USAF, MC
Surgeon
Headquarters Air University
Maxwell Air Force Base, Alabama

ARMS AND THE STATE, Civil-Military Elements in National Policy by Walter Millis with Harvey C. Mansfield and Harold Stein: The Twentieth Century Fund, New York, 1958, $4.50.

One would expect to find the usual indictment of military meddling with government in a book devoted to "civil-military elements in national policy." But the Twentieth Century Fund which sponsored the study and publication of **Arms and the State** has attracted some broad-gauge scholars of considerable military sophistication. Civil-military relations have provided the major field of inquiry for these researchers at Princeton University since 1951.

Rather than a military indictment, this study is a sober analysis of the military influence on national policy. No sides are taken for or against the uniform. Some obvious bias can be detected with regard to certain individuals involved (General MacArthur, for example) but whether they did or did not wear a uniform seemed not to be at issue.

The study under review was initiated by Harold Stein who, because of illness, passed the ball to Harvey C. Mansfield, who subsequently passed it to Walter Millis. The first 136 pages cover World War II matters as developed by Mansfield and Stein. Millis takes it from there up through the Korean truce in 1953, for a total of 414 pages of text.

Because of the several authors, there is some lack of consistency in approach and point of view as admitted in the foreword, but a vast amount of interesting material, much of which heretofore, unpublished, is well condensed to make an interesting behind-the-scenes account of our national military policy.

Arms and the State is a chronology of the formulation of U. S. foreign and defense policy with an emphasis on the civil-military interplay. The almost pathological isolationism demonstrated in the decade before World War II to the unqualified internationalism and faith in collective security of the following decade provide the dramatic sweep of history upon which the study rests.

The thesis of this study is hard to detect since its approach is historical rather than explanatory or argumentative. Analyses and conclusions are lightly drawn from the events related, and the principle point left with the reader is that it is difficult to discriminate between civil and military influences; that positions taken by military leaders are as widely varied as those taken by civilian leaders.

The historical emphasis on "civilian control," still scaring the public with its boogiemen in the reorganizations following World War II, was put in its proper place by Millis: "Few noticed that it was not, in fact, of much relevance to the practical issues which confronted the country. It had been born in the eighteenth-century fear and loathing of a standing army as a menace to the liberties of the people. But by 1945 our liberties seemed safe enough from military subversion. The danger of a military dictator using the bayonets of his troops to turn the Congress into the streets or overthrow the Constitution had lost what little shred of reality it ever had in the United States."

A minor (and probably unintentional) thesis which seems to be shared by all three authors is the anti-MacArthur bias. This is revealed as early as page 22 in describing MacArthur's onerous task of evacuating bonus marchers from Washington in 1932, as if this were the General's idea and relish. A parenthetical remark says ". . . that Tugwell records Roosevelt as having remarked . . . during the 1932 campaign . . . that he regarded MacArthur and Huey Long as the two most 'dangerous' men in America, because of their authoritarian tendencies." A seventy-three page chapter entitled "Truman and MacArthur" provides a vivid picture of this great American feud.

This study is a fine contribution to the literature of recent civil-military relations in the United States. It will make a worthy addition to any military library.

Major General Dale O. Smith
Commander, 313th Air Division
APO 239, San Francisco, California

The Pen is Mightier - - -

I am a timid, humble soul. I have no heart for fighting.
I have no bent for argument, except it be in writing.
I don't engage in wordy quarrels or shine at Public brawling;
All that is rot, for I am not a pugilist by calling.
But when the battle's waged with type I know no such restriction;
I wield the stick of rhetoric and break their heads with diction.
I lay men low with adjectives and phrases smooth as satin,
And when they still show fight I kill them off with shots of Latin.
The stoutest adversary falls into a dying spasm,
And breathes his last when soundly gassed with logic and sarcasm.
With adverbs keen I gouge out eyes. I've made a hundred cripples
Of men who've found I hold my ground when armed with participles.
There may be bolder men than I, and more blood-thirsty fighters,
But I'm a tough egg, sure enough, when the weapons are typewriters.

—by EDWARD F. FOSTER

NOTE: The above poem appeared in the 1948 edition of Editor and Editorial Writer, by A. Gayle Waldrop, and is reprinted by permission of the publisher, Rhienhart & Company, Inc.

NEWS ITEM

Metallic Roles in Aircraft

Steel has an important role to play in the future of aircraft, missiles and space vehicles, but the steel industry must face stiff competition from some newer metals, L. P. Spalding, chief materials engineer at North American Aviation's Los Angeles division, said today.

Addressing the American Iron and Steel Institute's Commercial Research Committee in San Francisco, Spalding discussed "The Future of Steel and Its Competitors in Aircraft and Missile Application."

"Materials of the highest quality and uniformity, produced in shapes, sizes and forms uncommon in steel industry experience will be required," Spalding told the committee.

Basing his remarks on years of experience in the aviation materials field, Spalding used the North American B-70 manned bomber as an example of what can be expected in aircraft of the future.

"The B-70 is a high speed, high altitude, long-range bomber whose mission requirements result in structural temperatures from 400F to 650F (and higher in some areas) which must be sustained for a few hours in flight," Spalding stated. "Anticipated life is such that some thousands of hours may be accumulated at elevated temperatures."

Temperature and weight considerations are foremost in obtaining maximum structural efficiency, he said, and to build the B-70 much research into all types of possible materials was required. Not only must the metals of aircraft of the future meet the strength and temperature requirements, they must also be workable.

"The B-70 is almost a flying fuel tank," he said, "and to minimize weight it is necessary that the basic load-carrying structure directly contain the fuel, thus eliminating internal tanks. This suggests that the structure be assembled by fusion welding, since sealing of bolted and riveted structures for high temperature service appeared very difficult."

Early investigation had shown that the best choices, steel and titanium alloys (steel's nearest competitor at the time), possessed nearly equal structural efficiency with one or the other showing slight advantages in different locations.

More research revealed that the best form for utilizing thin sheets of metal skin with light weight stiffeners could be obtained in brazed honeycomb sandwich form. Brazing of steel appeared feasible while brazing techniques as well as welding and heat treatment of titanium seemed much more questionable. Honeycomb sandwich also gives a bonus in insulation characteristics.

"Making some generalizations," Spalding added, "we can say that steels are available, cheap, strong, formable, weldable and brazeable. At least some of them are corrosion resistant and have good strength at moderately high temperatures."

But steel producers must not rest on their laurels simply because steel will be the primary metal in the B-70, Spalding warned.

"I think you should assume that metallurgical advances in titanium will overcome current limitations," he said.

Other metals with good potential for future aircraft are columbium, molybdenum, tantalum, tungsten, and beryllium, depending on heat ranges to be encountered in the future.

Spalding said that the B-70 may use as much as 50 to 75 tons of steel products, mostly thin gauge sheet, for each aircraft. These will be alloy and stainless grades procured to exacting specifications. In future aircraft, the chief competitors of steel are expected to be titanium and beryllium.

To stay in competition, he warned, the steel industry must become more flexible with constant metallurgical advances to develop the ultimate potential of steel—primarily a mental flexibility on the part of the industry and an open-minded approach to problems of the aircraft industry.

THE AIR FORCE HISTORICAL FOUNDATION

The Air Force Historical Foundation, established in 1953, is an independent, incorporated body, operating under the sanction of law as a nonprofit organization.

The Foundation is dedicated to the preservation, perpetuation and appropriate publication of the history and traditions of the United States Air Force and its predecessor organizations, and of the men whose lives have been devoted to that Service.

The business and objectives of the Foundation are educational and literary; to preserve the annals of American air power, especially the annals of the United States Air Force, its components, subsidiaries and affiliates, and of the individuals of whom they are composed; to disseminate to the public and to posterity accurate and complete historical information on air power subjects; and to preserve in a central repository significant materials depicting the history, culture, and traditions of the United States Air Force and the organizations which preceded it.

The government of the Foundation is vested in a board of twenty-four elected trustees, who serve a four-year term, and the following persons who are ex-officio members: The civilian head of the United States Air Force; the military head of the United States Air Force and his immediate predecessor; the commander of the Air University and the superintendent of the Air Force Academy.

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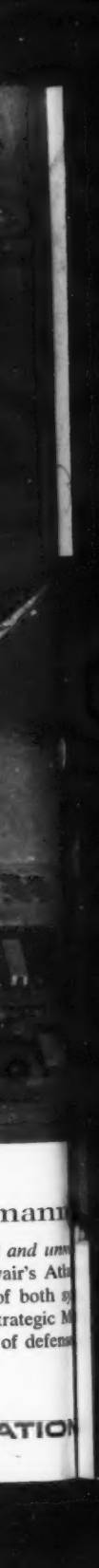
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